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**Biology of the
Allegany Indian Reservation
and Vicinity**

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PART 1: THE ALGAE

BY

GEORGE JOHN SCHUMACHER

Museum Expert

PART 2: THE SEED PLANTS

BY

STANLEY JAY SMITH

Curator of Botany

**PART 3: THE AMPHIBIANS, REPTILES
AND MAMMALS**

BY

MARGARET M. STEWART

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**NEW YORK STATE MUSEUM
AND SCIENCE SERVICE
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*The University of the State of New York
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The Algae of the Allegany Indian Reservation and Vicinity

BY

GEORGE JOHN SCHUMACHER*

Museum Expert

New York State Museum and Science Service

During the summer of 1957, the New York State Museum conducted a survey of the Allegheny River area. This survey involved all the disciplines of the Museum either directly or indirectly and it was proposed that a study of the algae be included. Toward this end a three-week period extending from August 7 through August 28 was spent in that region collecting the necessary samples.

It was evident that the area could be divided into three geographical regions, namely the Allegany State Park, the Allegany Indian Reservation and the immediate surrounding country. Actual collecting stations were located in all three areas and they were selected on a threefold basis; i.e., because of an interesting ecological situation, because of the desirability to visit as many of the tributaries to the Allegheny as possible and to establish stations in various geographical locations. In this manner it was hoped a truly representative series of collections could be obtained. The number of collections made at any one particular station depended solely upon the variety of habitats exhibited by that station and the apparent quality of the algae. A sum total of 188 collections was made during the survey, representing samples from 46 established stations.

The stations established outside the area are included because they are similar in many respects to those stations located within the area, and their individual floras add tremendously to the overall flora. Of lesser importance are the facts that they are only a few miles from the main area and their number is small.

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All collections were placed in glass bottles and examined in the fresh condition upon return to camp. In this manner such preliminary examinations revealed many forms that might otherwise be destroyed or altered due to preservation. All material was ultimately preserved in 5-10 percent formalin and received extensive examinations during the following winter months. All collections have been deposited in the New York State Museum.

DESCRIPTIONS OF STATIONS

1. Small tributary to *Stoddard Creek*. A small, narrow, shallow stream with cold water and rocky bottom. The margins are heavily shaded. Altitude 1,760.*
2. *Frances Brook*. A small brook connecting several beaver ponds. Altitude 1,760.
3. Same location as No. 2 but on south side of Frances Brook Road.
4. *Beaver Pond*. A shallow pond with no marginal cover or shade. Runoff from nearby hillside has caused considerable silting. Altitude 1,690.
5. *Quaker Lake*. An artificially dammed lake situated on Quaker Run. The lake is approximately 300 yards long and 125 yards at its widest point. The western portion is used quite heavily for fishing and swimming. The eastern (inlet) portion is very shallow and muddy. Altitude 1,900.
6. A small *cattail-sphagnum marsh* along south side of A.S.P. No. 3, 0.9 mile west of Quaker Lake. Seepage keeps the area damp and small puddles persist in depressions during periods of drought. Altitude 1,740.
7. *Quaker Run*. Rapidly moving water over rock bottom. Altitude 1,800.
8. *Tunungwant Creek*, Town of Limestone. A large, deep, silted creek supporting a luxuriant growth of *Potomageton*. Altitude 1,400.
9. *Tunungwant Swamp*. A rather extensive swamp that was completely dry during the period of investigation. The only water seen was in small holes and depressions. Altitude 1,400.
10. *Riverside Junction Swamp*. A disappointing location in that very little water was present during August. Altitude 1,400.
11. Small tributary to *Limestone Brook*, immediately west of location No. 8. Extremely muddy due to runoff from nearby cultivated fields. Altitude 1,440.
12. Series of *small pools* and *beaver ponds* along Bay State Brook. Denuded areas surrounding this location have added much silt and the bottoms of the ponds and brooks are covered with soft mud. Altitude 1,640-1,480.
13. *Cain Hollow*. A small, cool stream in wooded area. Altitude 1,440.
14. *Fir Tree Swamp*. Previous investigators have cited this small area as an interesting relic of bygone days. Unfortunately, this investigator was hard put to find any suitable collecting locales in the

*All elevations are expressed in terms of feet above sea level.

"swamp." Moisture of any sort was apparent only in the northern portion of the area in holes left by fallen trees and in the depressions around a few hummocks. Altitude 1,370.

15. *Red House Lake*. A triangular shaped lake with a dam along the western margin. It is shallow and fed from all sides by four tributaries. The lake is used extensively for boating, fishing and swimming. However, most of the shores possess some type of aquatic vascular vegetation. Altitude 1,420.
16. *Cricks Run*. A narrow woodland stream. Altitude 1,380-1,340.
17. *Holt Run*, similar to No. 16. Altitude 1,380.
18. *Allegheny River* at mouth of Quaker Run. Exposed mudflats are in evidence here due to the silt being deposited by Quaker Run. The river itself is shallow and swift at this point. Altitude 1,330.
19. *Wolf Run*. A small stream passing through woodland and farmland. Altitude 1,320.
20. *Wolf Run* at junction of Brown's Hollow. Altitude 1,400.
21. *Island in Allegheny River*. Three miles south of junction of A.S.P. No. 3 with N. Y. 346. A flat sandy oval-shaped island in the middle of the river. Altitude 1,300.
22. *Allegheny River* at Onoville. Altitude 1,280.
23. *Sphagnum bog*, one-quarter mile southwest of the junction of A.S.P. No. 2 and No. 3. Altitude 2,200.
24. *Red House Lake*, collections made along north shore of lake described in item 15.
25. *Beeline Creek*, near eastern end of Red House Lake. Altitude 1,400.
26. *Red House Creek*, at western end of the lake. A narrow and shallow creek with swiftly moving water. Altitude 1,380.
27. *Boyd Creek*, near camp No. 8. A small creek that falls quickly in a short distance. Altitude 1,560.
28. *Boyd Creek*. Altitude 1,550.
29. *Small beaver pond*, 0.9 mile north of Camp Arrowhead. The pond is only 20 yards in diameter and its bottom is covered with a thick layer of silt. Altitude 1,600.
30. *Red Pond*, northwest of Steamburg and east of Blood Road. A large boglike pond that is ringed by heavy growth of shrubs and small trees including *Rhus vernix* L. The water is rich in organic matter and the bottom soft from decaying vegetation. Altitude 1,410.
31. *Abandoned gravel pit*, between N. Y. 17 and the Allegheny River, three-fourths mile west of Red House. An extensive abandoned pit, long and narrow with steep sides. Altitude 1,340.
32. *Randolph Fish Hatchery*. Altitude 1,300.
33. Mouth of *Wolf Run*, where it joins the Allegheny. Altitude 1,327.
34. *Allegheny River* in vicinity of Breed Run. Eastern banks are shored with metal pilings as the river makes a sharp turn. Altitude 1,360.
35. *Allegheny River*, City of Salamanca. Most of the collections from this site were taken along the exposed flats lining the northern shore. Altitude 1,370.
36. *Titus Run*, at Salamanca's southern city limits. A very small, weak stream. Altitude 1,430.
37. *Wet roadside banks*, 0.6 mile south of Carrolton Run. Altitude 1,500.

38. Mouth of *Tunungwant Creek* where it joins the Allegheny River. A broad, deep mouth choked with *Potomageton*. Altitude 1,400.
39. *English Brook*. A small woodland brook with stony bottom. Altitude 1,500.
40. *Bear Springs*, 2.5 miles north of Quaker Run Administration Building. Altitude 1,920.
41. Headwaters of *Stoddard Creek*. Altitude 2,200.
42. *Stoddard Creek*, lower end. In this area the creek's flow becomes slower and the water is exposed to more light and runoff. Altitude 1,440.
43. *Bear Caves*, three-fourths mile north of A.S.P. No. 3 near Stony Brook. Samples taken from trees and logs in the vicinity. Altitude 1,780.
44. *Pool* along stream under Erie Railroad bridge on N. Y. 17. Pool was very sluggish and stagnant. Altitude 1,367.
45. *Farm pond* at junction of N. Y. 242 and N. Y. 17 near East Randolph. Altitude 1,320.
46. *Small pit* just off south side of N. Y. 17. Three-fourths mile west of Red House. The pit is now being used as a dump for unwanted brush. It is 20 feet deep and 50 feet in diameter but at the time it held only a few inches of water. Altitude 1,340.

The foregoing stations may be grouped according to their ecological similarities. The first group is exemplified by Quaker Run—a relatively narrow stream with fast-moving water and a rocky bottom. Most of its course is run through wooded areas and its banks are shallow but straight. Other members of this group would be Stoddard Creek, Cain Hollow, Cricks Run, Holt Run, Wolf Run, Beeline Creek, Red House Creek, Boyd Creek and English Brook; all are found within the boundaries of the State Park. Due to their swiftness, shade and bottom, they support little in the way of plantlife with the exception of diatoms. Typical of their algal content would be *Ulothrix zonata*, *Mougeotia* sp. and *Zygnema* sp.

Group two differs from the preceding in that the streams are slower moving and their waters receive more light. Due to the runoff from the surrounding terrain they are inclined to have silt over the bottom. This class includes Frances Brook, Limestone Brook, Titus Run and, in some respects, Tunungwant Creek. The latter creek is much broader and deeper than the rest but it shares their silted, open characteristics. Such genera as *Oscillatoria*, *Oedogonium* and *Spirogyra* are found here.

The third division has only one member, the Allegheny River. Due to its size, shallowness and general lack of aquatic vegetation it is placed in a class by itself. Attached to stones in the moving water would be found *Cladophora glomerata* and *Stigeoclonium nanum*, while in the tychoplankton and small puddles offshore would be species of *Selenastrum* and *Scenedesmus* and the blue-greens *Aphanocapsa*, *Merismopedia* and *Spirulina*.

The lakes comprise the fourth group. These are relatively large bodies of water, although they are shallow, and are fed and drained by streams. In this area, only Quaker Lake and Red House Lake are in this category. Both of these lakes are artificially dammed along their western margin. Their eastern margins support vegetation common to

marshes. The remaining shores are populated by waterweeds and water-lilies. This type of habitat favors the growth of desmids, especially certain species of *Netrium*, *Closterium* and *Cosmarium*. Other tycho-plankton species are represented by the genus *Scenedesmus*. The presence of species that require hard water, a high nitrogenous content and an above average supply of CO_2 give an indication as to the physical-chemical nature of the lakes. These indicator organisms are *Microcystis aeruginosa*, *Coelosphaerium naegelianum* and, to a lesser degree, *Dinobryon bavaricum*.

The small beaver ponds constitute the fifth group. Most of the ponds in this area are small, rather shallow, heavily silted and have exposed shorelines. The presence of silt on the bottom and in suspension creates a situation that is unfavorable to aquatic vegetation, both vascular and nonvascular. The effect of the animal population on such a situation is evidenced by the presence of the algal plankters *Eudorina* and *Pandorina*. Both are frequenters of hard waters that possess a high amount of nitrogenous materials.

Grouping of the remaining stations would be difficult since they represent a variety of environs such as roadside ditches, pools, pits, moist soil etc. The most noteworthy of these is the acid bog, Red Pond. (An adequate description of this station appears in the preceding list of stations, No. 30). The algal flora of this habitat is marked by the presence of *Batrachospermum ectocarpum* and a desmid population rich in quality. Under such circumstances the blue greens would be poor qualitatively and quantitatively.

ANNOTATED LIST OF ALGAE FOUND IN AREA*

The numbers following the species listing and its habitat denote the station from which the sample was taken and the number of the particular collection in which the species was observed. The station numbers are 1 through 46 and correspond to those used in the section describing the stations. The collection numbers range from 1,500 to 1,689.

Since this is the first attempt to identify the algae of this area to species, all of the reports are new locality records. Actually, little work has been done in New York State on the algae. Therefore, no attempt has been made to claim new records for the State or county since all but the most common forms would represent some type of extension of the known range for the particular species. Instead, it is recommended that interested persons refer to the publications listed at the end of this paper for comparison and further information.

* Excluding diatoms and charas.

Division CHLOROPHYTA**Class CHLOROPHYCEAE****Order VOLVOCALES****1. Volvocaceae**

1. *Gonium pectorale* Mueller. Frequent in tychoplankton. 22-1,615 and 25-1,622.
2. *Gonium sociale* (Duj.) Warming. Rare in tychoplankton. 46-1,635.
3. *Pandorina morum* (Muell.) Bory. Frequent in tychoplankton and widespread in distribution. 4-1,520, 15-1,669, 25-1,622, 26-1,627 and 32-1,642.
4. *Eudorina elegans* Ehrenberg. In association with *Pandorina* in tychoplankton. 4-1,520, 26-1,627.

Order TETRASPORALES**2. Palmellaceae**

5. *Sphaerocystis Schroeteri* Chodat. Tychoplankton. 25-1,622.
6. *Gloeocystis vesiculosa* Naegeli. Tychoplankton. 15-1,594.

3. Tetrasporaceae

7. *Tetraspora gelatinosa* (Vauch.) Desvaux. Forming gelatinous masses on bottom in shallow, quiet water. 19-1,608.

Order ULOTRICHALES**4. Ulotrichaceae**

8. *Ulothrix zonata* (Weber & Mohr) Kuetzing. Small bits of green attached to stones in stream. 7-1,527.

5. Schizomeridaceae

9. *Schizomeris leibleinii* Kuetzing. Rare to frequent in tychoplankton. 15-1,552.

Order MICROSPORALES**6. Microsporaceae**

10. *Microspora willeana* Lagerheim. Entangled with *Stigeoclonium*. 3-1,503.

Order CHAETOPHORALES**7. Chaetophoraceae**

11. *Stigeoclonium aestivale* (Hazen) Collins. Small bright green tufts attached to submerged twigs in creek. 3-1,503.
12. *Stigeoclonium nanum* Kuetzing. Attached to submerged aquatics. 22-1,616.
13. *Chaetophora attenuata* Hazen. Green gelatinous beads on submerged wood. 12-1,541.

8. Protococcaceae

14. *Protococcus viridis* C. A. Agardh. Common on bark of trees and logs. 40-1,673; 43-1,681.

Order CLADOPHORALES**9. Cladophoraceae**

15. *Cladophora glomerata* (L.) Kuetzing. Long green tufts on stones in rapids. 18-1,554.
16. *Basycladia chelonum* (Collins) Hoffmann & Tilden. On shell of *Chelydra serpentina*, the snapping turtle. 39-1,671.

Order OEDOGONIALES**10. Oedogoniaceae**

17. *Bulbochaete* sp. Common in many situations. On dead submerged wood, 5-1,537; on submerged aquatics, 24-1,616; in tychoplankton, 15-1,559 and 30-1,639.
18. *Oedogonium* sp. Common in many situations. On submerged aquatics, 4-1,501, 8-1,587, 15-1,551 and 24-1,616; in tychoplankton, 2-1,504, 15-1,670 and 45-1,687.

Order CHLOROCOCCALES**11. Characiaceae**

19. *Characium rostratum* Reinhard. Attached to filaments of *Oedogonium*. 15-1,551.

12. Hydrodictyaceae

20. *Pediastrum boryanum* (Turp.) Meneghini. In shallow puddles, 18-1,582 and 35-1,660; in small pond south of main area, 32-1,642.
21. *Pediastrum boryanum* var. *undulatum* Wille. In small pond south of main area, 32-1,642.
22. *Pediastrum duplex* Meyen. In shallow puddles, 18-1,582.
23. *Pediastrum duplex* var. *clathratum* (A. Braun) Lagerheim. In tychoplankton, 22-1,615; in shallow puddles, 35-1,660.
24. *Pediastrum simplex* (Meyen) Lemmermann. In plankton near dam, 26-1,627.
25. *Pediastrum tetras* (Ehrenb.) Ralfs. One of the most widespread of the plankton green algae, 4-1,520, 15-1,591, 15-1,594, 22-1,615, 25-1,622 and 35-1,660.
26. *Pediastrum tetras* var. *tetraodon* (Corda) Rabenhorst. In scrapings taken from metal pilings, 34-1,659.

13. Coelastraceae

27. *Coelastrum cambricum* Archer. In scrapings taken from metal pilings, 34-1,659; common in small puddles, 35-1,660; tychoplankton, 46-1,635.
28. *Coelastrum microporum* Naegeli. Tychoplankton, 25-1,627.
29. *Coelastrum scabrum* Reinsch. Rare, but excellent coenobes in tychoplankton, 15-1,669.
30. *Coelastrum sphaericum* Naegeli. Tychoplankton, 4-1,520.

14. Oocystaceae

31. *Dictyosphaerium ehrenbergianum* Naegeli. Tychoplankton, 15-1,670 and 46-1,635.
32. *Dictyosphaerium pulchellum* Wood. Tychoplankton, 22-1,615; in shallow puddles, 34-1,660.

33. *Oocystis pusilla* Hansgirg. In shallow quiet water, 19-1,608.
34. *Lagerheimia longiseta* var. *major* G. M. Smith. Cells with chloroplasts in two parietal plates, each with a pyrenoid; setae up to 56μ in length. Rare in tychoplankton, 46-1,635.
35. *Dimorphococcus lunatus* A. Braun. In scrapings taken from metal pilings, 34-1,659.
36. *Ankistrodesmus falcatus* (Corda) Ralfs. Mixed with *Cladophora*, 18-1,554; tychoplankton, 22-1,615 and 46-1,635; in scrapings taken from metal pilings, 34-1,659.
37. *Selenastrum bibraianum* Reinsch. Tychoplankton, 4-1,520 and 22-1,615; mixed with blue-greens along muddy shore margins, 34-1,658.
38. *Selenastrum gracile* Reinsch. In shallow puddles, 35-1,660.
39. *Selenastrum westii* G. M. Smith. Mixed with *Cladophora*, 18-1,554.
40. *Kirchneriella contorta* (Schmidle) Bohlin. Tychoplankton, 22-1,615; in small shallow puddles, 35-1,660.
41. *Tetraëdron regulare* var. *incus* Teiling. Mixed with *Cladophora*, 18-1,554.
42. *Polyedriopsis spinulosa* Schmidle. Frequent in tychoplankton, 22-1,615.

15. Scenedesmaceae

43. *Scenedesmus abundans* var. *longicauda* G. M. Smith. In shallow puddles, 35-1,660.
44. *Scenedesmus acuminatus* (Lag.) Chodat. In shallow puddles, 35-1,660; tychoplankton, 46-1,630.
45. *Scenedesmus acutiformis* Schroeder. Tychoplankton, 25-1,622 and 46-1,635.
46. *Scenedesmus arcuatus* Lemmermann. Tychoplankton, 15-1,594.
47. *Scenedesmus armatus* (Chod.) G. M. Smith. In shallow puddles, 35-1,660.
48. *Scenedesmus bijuga* (Turp.) Lagerheim. Tychoplankton, 15-1,669.
49. *Scenedesmus brasiliensis* Bohlin. Tychoplankton, 15-1,669.
50. *Scenedesmus carinatus* (Lemm.) Chodat. Tychoplankton, 15-1,669.
51. *Scenedesmus dimorphus* (Turp.) Kuetzing. Frequent in tycho-plankton, 22-1,615, 25-1,622 and 46-1,635; mixed with *Cladophora*, 18-1,554; in scrapings taken from metal pilings, 34-1,654.
52. *Scenedesmus hystrix* Lagerheim. Tychoplankton, 15-1,670.
53. *Scenedesmus obliquus* (Turp.) Kuetzing. In shallow puddles, 35-1,660.
54. *Scenedesmus opoliensis* P. Richter. Mixed with blue-greens on muddy margins, 34-1,658; tychoplankton, 46-1,630.
55. *Scenedesmus quadricauda* (Turp.) de Brébisson. Tychoplankton, 22-1,615 and 46-1,630.
56. *Scenedesmus quadricauda* var. *longispina* (Chod.) G. M. Smith. In shallow puddles. 35-1,660.
57. *Actinastrum hantzschii* var. *fluviale* Schroeder. Tychoplankton, rare in 15-1,669, common in 22-1,615; in scrapings taken from metal pilings, 34-1,659.
58. *Crucigenia truncata* G. M. Smith. Rare in tychoplankton, 22-1,615 and 46-1,635.

59. *Micractinium pusillum* Fresenius. Tychoplankton, 22-1,615.
60. *Micractinium pusillum* var. *elegans* G. M. Smith. Rare in scrapings taken from metal pilings, 34-1,659.

Order SIPHONALES

16. Vaucheriaceae

61. *Vaucheria* sp. Floating mat in stream, 41-1,677.

Order ZYGNEMATALES

17. Zygnemataceae

62. *Mougeotia* sp. Common in varied situations, 2-1,504, 3-1,551, 6-1,524, 13-1,580, 16-1,601, 17-1,606, 18-1,597 and 28-1,628.
63. *Spirogyra* sp. Common, 2-1,505, 3-1,509, 4-1,500, 5-1,518, 6-1,516, 10-1,526, 25-1,622, 42-1,680 and 44-1,682.
64. *Zygnema* sp. In scrapings of dam spillway, 5-1,513; floating in backwaters, 16-1,601 and 18-1,597.

18. Mesotaeniaceae

65. *Netrium digitus* (Ehrenb.) Itzigsohn & Roth. One of the most widespread organisms of this order. In scrapings of wet cliff at base of dam, 5-1,515; tychoplankton, 15-1,591, 15-1,670, 24-1,614, 25-1,620 and 30-1,639.
66. *Spirotaenia condensata* de Brébisson. Frequent in tychoplankton, 15-1,594 and 17-1,606.
67. *Spirotaenia trabecula* A. Braun. In sluggish backwater, 13-1,580.

19. Desmidiaceae

68. *Closterium diana* Ehrenberg. Tychoplankton, 15-1,594.
69. *Closterium didymotocum* Corda. One cell seen was extremely large, 740 μ x 35 μ . Tychoplankton, 15-1,591 and 15-1,670.
70. *Closterium incurvum* de Brébisson. Tychoplankton, 15-1,670, 25-1,622 and 26-1,627.
71. *Closterium moniliferum* (Bory) Ehrenberg. Tychoplankton, 15-1,552 and 25-1,622.
72. *Closterium striolatum* Ehrenberg. Tychoplankton, 15-1,594.
73. *Closterium turgidum* Ehrenberg. Tychoplankton, 15-1,591.
74. *Closterium venus* (Kuetz.) de Brébisson. Tychoplankton, 15-1,594.
75. *Penium margaritaceum* (Ehrenb.) de Brébisson. Tychoplankton, 25-1,622.
76. *Pleurotaenium ehrenbergii* var. *granulatum* Ralfs. Apical poles with five tubercles in face view. Rare in tychoplankton, 30-1,639.
77. *Pleurotaenium maximum* (Reinsch) Lundell. Tychoplankton, 15-1,552 and 15-1,670.
78. *Pleurotaenium nodulosum* de Brébisson. Tychoplankton, 4-1,520 and 15-1,594.
79. *Pleurotaenium trabecula* (Ehrenb.) Naegeli. Tychoplankton, 4-1,520 and 25-1,622; in scrapings taken from metal pilings, 34-1,659.
80. *Tetmemorus brebissonii* (Menegh.) Ralfs. Tychoplankton, 30-1,639.

81. *Tetmemorus brebissonii* var. *minor* de Bary. Excellent cells seen, averaging 75μ in length, 19μ in width and 13μ at the isthmus. Frequent in tychoplankton, 30-1,639.
82. *Euastrum abruptum* var. *minor* West & West. Tychoplankton, 15-1,669.
83. *Euastrum didelta* (Turp.) Ralfs. Tychoplankton, 30-1,639.
84. *Euastrum insulare* (Witt.) Roy. Tychoplankton, 15-1,591 and 15-1,594.
85. *Euastrum verrucosum* Ehrenberg. Frequent in tychoplankton, 25-1,619.
86. *Cosmarium granatum* de Brébisson. Tychoplankton, 4-1,520, 15-1,594, 24-1,614 and 25-1,622.
87. *Cosmarium holmiense* Lundell. Excellent cells in shallow quiet water, 19-1,608.
88. *Cosmarium holmiense* var. *integrum* Lundell. In scrapings of wet cliff at base of dam, 5-1,515.
89. *Cosmarium impressulum* Elfv. Tychoplankton, 15-1,670 and 25-1,622.
90. *Cosmarium margaritatum* (Lund.) Roy & Bissett. Tychoplankton, 15-1,594 and 15-1,670.
91. *Cosmarium ovale* var. *prescottii* Irenée-Marie. Several excellent cells seen; row of granules at isthmus and two rows of granules around edge quite evident. Tychoplankton, 15-1,594.
92. *Cosmarium pachydermum* Lundell. Cell wall 2.5μ in thickness. Tychoplankton, 25-1,620.
93. *Cosmarium polygonum* (Naeg.) Archer. Tychoplankton, 15-1,594.
94. *Cosmarium portianum* Archer. Tychoplankton, 15-1,670 and 24-1,614.
95. *Cosmarium protractum* (Naeg.) de Bary. Tychoplankton, 15-1,669, common in 15-1,670 and 25-1,622.
96. *Cosmarium punctulatum* de Brébisson. Tychoplankton, 25-1,619.
97. *Cosmarium punctulatum* var. *subpunctulatum* (Nordst.) Börgesen. Tychoplankton, 15-1,591 and 15-1,594.
98. *Cosmarium quadratum* Ralfs. In squeezings of sphagnum from inlet, 5-1,529.
99. *Cosmarium regnellii* Wille. Tychoplankton, 15-1,591 and 25-1,619.
100. *Cosmarium sportella* de Brébisson. Tychoplankton, 25-1,619.
101. *Cosmarium subcostatum* Nordstedt. Rare in tychoplankton, 15-1,670.
102. *Cosmarium subreniforme* Nordstedt. Tychoplankton, 25-1,622; in small ponds south of main area, 32-1,642.
103. *Cosmarium subtumidum* Nordstedt. Rare in tychoplankton, 15-1,670.
104. *Arthrodesmus octocornis* Ehrenberg. Rare in tychoplankton, 30-1,639.
105. *Staurastrum alternans* de Brébisson. Tychoplankton, 22-1,616.
106. *Staurastrum arcticon* (Ehrenb.) Lundell. Tychoplankton, 15-1,594.
107. *Staurastrum breviaculeatum* G. M. Smith. Rare in tychoplankton, 30-1,639.

108. *Staurastrum chaetoceras* (Schroeder) G. M. Smith. Frequent in tychoplankton, 22-1,615 and 24-1,616.
109. *Staurastrum cuspidatum* var. *divergens* Nordstedt. Common in tychoplankton, 30-1,639.
110. *Staurastrum denticulatum* (Naeg.) Archer. Tychoplankton, 15-1,594.
111. *Staurastrum furcatum* var. *pisiforme* Turner. Frequent in tychoplankton, 30-1,639.
112. *Staurastrum natator* W. West. In scrapings taken from metal pilings, 34-1,659.
113. *Staurastrum orbiculare* Ralfs. Tychoplankton, 15-1,594.
114. *Staurastrum polymorphum* de Brébisson. Tychoplankton, 15-1,594, 15-1,670 and 25-1,622.
115. *Micrasterias papillifera* de Brébisson. In small depression of sphagnum marsh, 6-1,524.
116. *Micrasterias radiata* Hassall. Tychoplankton, 15-1,594, 15-1,670 and 25-1,622.
117. *Micrasterias truncata* (Corda) de Brébisson. Tychoplankton, 30-1,643.
118. *Micrasterias truncata* var. *semiradiata* Cleve. Rare in tychoplankton, 30-1,639.
119. *Sphaerosoma granulatum* Roy & Bissett. Tychoplankton, 15-1,594 and 25-1,622.
120. *Hyalotheca dissiliens* (Smith) de Brébisson. In still water of pool, 12-1,577.
121. *Hyalotheca mucosa* (Dillw.) Ehrenberg. In shallow depression, 9-1,538; tychoplankton, 15-1,594, frequent in 15-1,670 and 25-1,622.

Division CHRYSOPHYTA

Class CHRYSOPHYCEAE

Order CHRYSOMONADALES

20. Synuraceae

122. *Synura uvella* Ehrenberg. In small beaver pond, tychoplankton, 3-1,503.

21. Ochromonadaceae

123. *Dinobryon bavaricum* Imhof. Euplankton, 5-1,513.
124. *Dinobryon cylindricum* Imhof. In shallow marginal waters, 30-1,639.

Division PYRRHOPHYTA

Class DINOPHYCEAE

Order PERIDINIALES

22. Glenodiniaceae

125. *Glenodinium palustre* (Lemm.) Schiller. Tychoplankton, 30-1,639.

23. Peridiniaceae

126. *Peridinium cinctum* (Muell.) Ehrenberg. In plankton near dam, 26-1,627.
127. *Peridinium limbatum* (Stokes) Lemmermann. Rare in tychoplankton, 30-1,639.

Division CYANOPHYTA

Class MYXOPHYCEAE

Order CHROOCOCCALES

24. Chroococcaceae

128. *Chroococcus turgidus* (Kuetz.) Naegeli. In small depressions in sphagnum marsh, 6-1,524.
129. *Aphanocapsa elachista* West & West. Tychoplankton, 22-1,615 and 46-1,635.
130. *Microcystis aeruginosa* Kuetzing. Tychoplankton, 15-1,594, 15-1,670 and 31-1,637.
131. *Merismopedia elegans* A. Braun. In floating debris, 27-1,599.
132. *Merismopedia glauca* (Ehrenb.) Naegeli. Tychoplankton, 15-1,669 and 22-1,616.
133. *Merismopedia punctata* Meyen. In scrapings taken from metal pilings, 34-1,659.
134. *Coelosphaerium kuetzingianum* Naegeli. Tychoplankton 31-1,637.
135. *Coelosphaerium naegelianum* Unger. Tychoplankton, 15-1,591, 15-1,594 and common in 26-1,627.

Order HORMOGONALES

25. Oscillatoriaceae

136. *Spirulina major* Kuetzing. Very common with other blue-greens on muddy margins, 34-1,658; in scrapings taken from metal pilings, 34-1,659; on bottom and submerged objects, 38-1,668.
137. *Oscillatoria formosa* Bory. Common on muddy margins, 34-1,658; in puddles on island, 21-1,612.
138. *Oscillatoria limosa* (Roth) C. A. Agardh. Forming brown mats on stones on bottom, 20-1,610; common in shallow puddles, 35-1,660; floating in stream, 41-1,679.
139. *Oscillatoria princeps* Vaucher. Tychoplankton, 25-1,622; in shallow puddles, 30-1,660.
140. *Oscillatoria sancta* (Kuetz.) Gomont. Entangled with floating mat of *Vaucheria*, 41-1,677.
141. *Oscillatoria tenuis* C. A. Agardh. Tychoplankton, 1-1,510 and 45-1,687; on mud, 15-1,669.
142. *Oscillatoria tenuis* var. *tergestina* (Kuetz.) Rabenhorst. Common, intermixed with floating debris, 15-1,591.

26. Nostocaceae

143. *Anabaena felsii* (Menegh.) Bornet & Flahault. Rare in tycho-plankton near dam, 26-1,627.
144. *Anabaena flos-aquae* (Lyngb.) de Brébisson. Forming a small bloom about shoreline, 24-1,605; frequent in floating debris, 25-1,620.
145. *Aphanizomenon flos-aquae* (L.) Ralfs. Along shore margin and in euplankton, 31-1,629 and 31-1,637.
146. *Cylindrospermum minutum* Wood. In scrapings of wet cliff at base of dam, 5-1,515.

27. Stigonemataceae

147. *Hapalosiphon hibernicus* West & West. Entangled with other algae in shallow water on stones and pebbles near dam, 26-1,627.

Division RHODOPHYTA

Class RHODOPHYCEAE

Order NEMALIONALES

28. Batrachospermaceae

148. *Batrachospermum ectocarpum* Sirodot. (?). The absence of reproductive organs makes positive identification of this species impossible. It is tentatively placed in this species because of the habitat and the vegetative characteristics. Frequent in small shallow areas about the margin, attached to submerged roots, 30-1,524 and 30-1,539.

SUMMARY AND CONCLUSIONS

The purpose of this survey was to collect algae from the Allegany State Park, the Allegany Indian Reservation and adjacent areas in order to supply information applicable to the following:

1. A qualitative study of the algae, their distribution throughout the area and their identification to species whenever possible.
2. A comparison of the current findings with those of the 1937 Biological Survey.
3. A prediction of what might happen should the area be flooded.

With these points in mind, each will be discussed.

1. Three weeks in the month of August were spent in the field collecting 188 samples from 46 stations. As a result, a total of 148 taxa in 65 genera and 28 families were identified. Those species worthy of special mention because of their relative rareness are *Schizomeris leibleinii*, *Lagerheimia longiseta* var. *major*, *Polyedriopsis spinulosa*, *Scenedesmus carinatus*, *Actinastrum hantzschii* var. *fluviale*, *Pleurotaenium ehrenbergii* var. *granulatum*, *Cosmarium ovale* var. *prescottii*, *Arthrodesmus octocornis* and *Staurostrum chaetoceras*. *Anabaena flos-aquae* should be mentioned as a cause of a minor bloom in Red House Lake.

The genera represented by the largest number of taxa are as follows: *Cosmarium*, 18; *Scenedesmus*, 14; *Staurostrum*, 10; *Closterium*, 7, and *Pediastrum*, 7. The families with the largest number of taxa are as follows: *Desmidiaceae*, 54; *Scenedesmaceae*, 18; *Oocystaceae*, 12; *Chroococcaceae*, 8, and *Hydrodictyaceae*, 8.

Further qualitative findings and individual distributions are given in the annotated list.

2. An actual comparison of this study with that conducted by the biological survey in 1937 cannot be made for several reasons. The algae mentioned in the 1937 survey were identified only to genus; 38 were listed, and the investigations were limited to Chautauqua Lake—a lake outside the area of this study. Lastly, the previous study was principally limnological rather than taxonomic.

3. From field observations and the material gathered, it is quite evident the Allegheny River is not a productive body of water for algae. This point was made by McVaugh (1937). He stated the growth of vegetation is seriously hindered by the swift-flowing waters and the bottoms covered with "waterworn glacial pebbles." He also noted the scouring action of periodic floods and the effects of pollutions in creating an unfavorable situation. As far as can be seen, all these conditions exist today and, as a result, the species that have managed to establish themselves are those that are extremely hardy and have little value.

For different ecological reasons, mentioned in the station descriptions, the mountain streams are quite barren and unproductive. If flooding of the area should occur, it will be along the river and lower portions of these streams. In such an event, little damage to the algal flora is foreseen, i.e. in amount or variety. If permanent flooding did take place, a condition could develop that would be favorable to the establishment and maintenance of more desirable algae, due to the increase in depth and the decrease in speed of such waters.

It is in the areas that will not be affected by inundation that the interesting algae are found; e.g. Red House Lake, Quaker Lake and Red Pond. If these and their kind are permitted to remain intact it would mean the great majority of the algae in the Allegheny River area would be untouched and allowed to flourish.

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Seed Plants of the Allegany Indian Reservation and Vicinity

Additions and Notes

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INTRODUCTION

The New York State Museum has had a traditional interest in the botany of southern Cattaraugus County, particularly that in and around the Allegany State Park. Several papers on the vascular plants and the vegetation of the area have already been published. This report should be considered as a supplement including the results of more recent explorations.

The present investigator concentrated on the Indian reservation and the oak woods near the Allegheny River. An effort was made to add to our knowledge of escapes and weeds in the area. Since the bulk of the previous botanizing in the region was done by scientists and students connected with the Allegany School of Natural History and their efforts were mostly made in the summer, special trips were made in spring and in autumn. All in all, most of the summer of 1957, a week in the spring of 1957, another in the spring of 1958 and a final week in the autumn of 1958 were spent in the area. In the summer of 1957, the writer was assisted by Paul F. Fendt. On the other trips, he was accompanied by Dr. Stephen W. Eaton, professor of biology, St. Bonaventure University.

The herbarium of the Allegany School of Natural History is now the property of St. Bonaventure University. Members of the staff of the latter institution have collected widely in the area and their specimens have all been made available for study. The writer has personally verified about 90 percent of the sheets in the St. Bonaventure herbarium. In addition, he has studied pertinent collections in the herbarium of the New York State Museum. These include many specimens collected by Dr. Homer D. House, former state botanist, and his colleagues in connection with earlier museum publications on the botany of the area as well as those of the present curator. They also include a set of specimens collected by Dr. William N. Fenton, now Assistant

Commissioner for the State Museum and Science Service, during his investigations on the ethnobotany of the Iroquois in 1938 and 1939. The first set of these specimens is preserved in the ethnobotanical collections of the University Museum of the University of Michigan.

These efforts have uncovered many interesting records which are detailed later. After studying all available published reports, it is concluded that a number of these records are apparently new. Unfortunately, the account of plants about St. Bonaventure by Fr. Hubert Vecchierello (1940-1942) is rather general and the supporting specimens are mostly not in existence. In this situation, the present writer has considered a taxon new to the area covered, unless Fr. Vecchierello cited specific stations for it, which could be pinpointed as within the area. As a result, 35 escapes, 75 weeds and 81 native species or subspecies are added to the list of plants in the region studied. These additions are indicated in the text by asterisks. The following are hitherto unreported from the State:

Escapes

Agrostis gigantea var. *gigantea*

Lespedeza stipulacea

Weeds

Malva rotundifolia

Natives

Carex caroliniana

C. grvida var. *grvida*

C. muricata var. *laricina*

Lilium canadense subsp. *editorum*

Baptisia tinctoria var. *projecta*

Chelone glabra subsp. *elatior*

Nomenclature is in accordance with the International Code (Lanjouw *et al.*, edit., 1956). One of the most noticeable changes is in the designation of a variety or a subspecies for the typical race of the species rather than using the binomial for two things: the species including all its variants and also the typical element of the species after variations are excluded. The typical element is designated by repeating the specific epithet without author-citation.

Synonyms are cited from **Gray's Manual** (Fernald, 1950), the **Illustrated Flora** (Gleason, 1952) and from other works where pertinent. Where the name used is in agreement with either the manual or the flora or both, no other references are given. Where it is different from the name (or author-citation) used in both those works, supporting references are cited or a defense is otherwise made of the chosen name. Where the race discussed is the typical one and no differentiation is noted by those works, a reference is given to support the treatment.

In papers of this kind, the author prefers to use a separate paragraph for each species or major race (one with incipient isolation). He considers these races as subspecies or possible subspecies. No new com-

binations are made, however, and, where a varietal combination is available, he has used that as a paragraph-heading, except in a few cases, where such usage might be misleading. In those cases and where no combination was found, the binomial was used. Minor varieties (without isolation) are sometimes mentioned without separate paragraphs.

The statements on distribution in the area and generally in the State are based on published reports and also on material in the files of the New York State Museum. References to the obvious sources (Eaton *et al.*, 1956; House, 1924; House and Alexander, 1927; House and Gordon, 1940; Jennings, 1953; Muenscher, 1935b; Smith, 1945; Wiegand and Eames, 1926; Zenkert, 1934) are omitted from the catalog but included in the bibliography.

All stations reported in this paper are shown on the map (p. 99) as far as possible. A few localities are outside these limits but may be found on ordinary roadmaps with two exceptions. Tributary No. 49 of the Allegheny River is a small stream entering the river opposite St. Bonaventure. Fivemile Creek enters the river from the north just west of the village of Allegany and just east of the map. A few localities in old reports could not be located on available maps. Two need some explanation. Jones Hill is the same as Roundtop on the map. Waterman Swamp, also known as Owlensburg Bog (and so designated in earlier reports) or Allenburg Bog, is outside the area, on the border of the Towns of Napoli and New Albion.

All specimens cited are in the herbarium of the New York State Museum, unless otherwise noted. Those in the herbarium of St. Bonaventure University are indicated by the abbreviation, St. B, in parenthesis. Specimens are cited by collector's number, if possible, by accession number or (in the absence of either) by date. Names of the three most frequently cited collectors are abbreviated:

Stephen W. Eaton E

Paul F. Fendt F

Stanley J. Smith S

The writer expresses his appreciation to individuals and institutions. St. Bonaventure University made its facilities available at all times. In particular, Professor Eaton was an amiable and interested host and an invaluable guide in the field. Mr. Fendt was a most helpful assistant. Donald M. Lewis, junior scientist, New York State Museum and Science Service, aided greatly in verifying citations in the manuscript. Dr. Eugene C. Ogden, state botanist, identified specimens in the *Potamogeton perfoliatus* complex. Dr. Harold W. Rickett, bibliographer, the New York Botanical Garden, aided in interpreting the International Code. Finally, the officials and various citizens of the Seneca Nation were most cooperative.

I. CULTIVATED PLANTS

Cultivated plants, if really acclimated to an area, tend to escape and become part of the established flora. Two such items, known to all, are the common dandelion, *Taraxacum officinale* Weber, and the field daisy, *Chrysanthemum leucanthemum* L. More recently, the sweet rocket, *Hesperis matronalis* L., has successfully colonized large areas of the State. There are many others. As noted in an earlier paper (Smith, 1945), records of such establishment are not common. The following notes add to knowledge of this problem in the Allegheny Valley in New York State.

Three elements are involved in the appearance of cultivated plants as spontaneous items in the area under consideration. One is escape from field, lawn, garden or park where cultivated by white people or by others under their cultural influence. This accounts for the bulk of the taxa. A second is the appearance of annuals, particularly cereal-grasses, about railroad yards where the seeds are apparently swept out of freight cars. These same grasses are occasionally spontaneous along roads and elsewhere. The third element is persistence or establishment after cultivation by the Indians. A notable example in this instance is the manroot, *Ipomoea pandurata* (L.) G. F. W. Meyer (House & Gordon, 1940). Another is the germander speedwell, *Veronica chamaedrys* L., which was planted by the Seneca Indian gardeners for its handsome blue flowers. If the plant in question is native in a region far removed from ours, the problem is not difficult. Where it is slightly out of range, it is a much harder matter to decide. Unproven cases are mentioned under the various species in the section on native plants.

* ***Agrostis gigantea*** Roth var. ***gigantea*** (var. *ramosa* Philipson, 1937). Waste places; rare. Along the railroad at Limestone, *S & F* 23171. This is the first specimen from New York State seen by the writer. The var. *dispar* (Mx.) Philipson (*A. alba* auct.; *A. stolonifera* var. *major*) is common.

* ***A. tenuis*** Sibth. Open areas; a local introduction. Grounds of abandoned nursery, east side of Salamanca, *S & F* 23466.

* ***Alopecurus pratensis*** L. Moist low grounds; occasional. Across river from St. Bonaventure, *S et al.* (St. B 3155); observed in Fox Hollow, at Killbuck and on the north side of Salamanca. New to southwestern New York and not reported from western Pennsylvania. Apparently overlooked because of early flowering or confusion with *Phleum pratense* L.

Arrhenatherum elatius (L.) Mert. & Koch. Roadsides; becoming common, as elsewhere in the State. Observed at the following stations: Limestone, west side of Allegany, north of Carrollton, Salamanca, north of Steamburg. Reported only from the vicinity of Allegany Park Rock City.

Bromus inermis Leyss. subsp. ***inermis*** (Wagnon, 1950). Roadsides and fields; increasing, as in other areas. To the station on Jones Hill

* Indicates additions to earlier local lists.

may be added the following observed localities: lower Quaker Run, east of Blacksnake Mountain, Cain Hollow, Killbuck.

* **Hordeum vulgare** L. Railroad yards; occasional. Observed at Allegany.

* **Lolium multiflorum** Lam. Waste places; occasional. Gravel along brook, west side of Allegany, S & F 23631. This species may be expected anywhere because of its frequent use in grass-mixtures.

* **Panicum milaceum** L. Cultivated places; rare. St. Bonaventure, *Vecchierello*, Sept. 8, 1943.

* **Secale cereale** L. Railroad yards; occasional. Allegany, S & F 23687, 24999.

* **Setaria italica** (L.) PB. Cultivated places and railroad banks. St. Bonaventure, *Vecchierello*, Sept. 8, 1943; Quaker Bridge, *Saunders*, July 18, 1939.

* **Sorgum sudanense** (Piper) Stapf (*S. vulgare* var. *sudanense*; *S. vulgare*, p. p., of Fernald, 1950 and Gleason, 1952). Roadsides; occasional. West of Steamburg, *S et al.* 24465. Despite the marked difference in appearance, the investigator would prefer to recognize this as part of the comprehensive species, previously called *S. vulgare* Pers. (*cf.* Karper & Chisholm, 1936). That name, unfortunately, is invalid (Shinners, 1956) and the writer has not located a combination. Pending such combination, he is following Pohl (1947) and Chase (1950).

* **Triticum aestivum** L. Railroads; a frequent casual. Limestone, S & F 23166; Allegany, S & F 23686; observed at Horseshoe, Quaker Bridge and Elko.

* **Zea mays** L. Roadsides and along railroads; occasional. Observed at Allegany, south of Peth and west of Steamburg.

Acorus calamus L. Swales and moist fields; more frequent than reported. Cricks Run, *Fenton* 89; observed west of Vandalia, north of Riverside Junction and at Killbuck. Reported, heretofore, only from Quaker Run.

* **Asparagus officinalis** L. subsp. *officinalis* (Clapham *et al.*, 1952). Roadsides; rare (?). Observed south of Peth.

Hemerocallis fulva (L.) L. (*cf.* synonymy in House, 1924). Occasional. An observation along lower Quaker Run at the mouth of Cain Hollow places it definitely in the park.

* **Ornithogalum umbellatum** L. Rare. Ditch near abandoned house site, north side of Salamanka, S & E 26517.

* **Populus** × **gileadensis** Rouleau (*P. canadensis* auct.). Low grounds; occasional. Several trees along the river, west of Allegany, S & E 24983; *E et al.*, May 20, 1958 (St. B).

* **Salix fragilis** L. Low grounds; at least locally common. Common about the oxbow, Horseshoe, *S et al.* 26399. Probably elsewhere.

* **Betula pendula** Roth (*B. alba*, auct.). Along railroads; occasional. Allegany, across Route 17 from St. Bonaventure, where there are several old planted trees, S 23659, 24993; Carrollton, S & F 23406, 23407. There are only a few records for the State.

* **Ranunculus repens** L. Ditches; rare. Cold Spring, S & E 24958 —f. *pleniflorus* (Fern.) House (House, 1924). Occasional in the State.

* **Berberis thunbergii** DC. Waste places, woods and thickets; occasional. St. Bonaventure, *E et al.* (St. B 1344); railroad yards, Allegany,

S & F 23632; observed in wet woods at Riverside Junction. Spreading in the State.

* ***B. vulgaris*** L. Old fields; occasional. Mountainside, St. Bonaventure, *Vecchierello*, Sept. 15, 1922.

* ***Fumaria officinalis*** L. Flowerbeds, etc.; occasional. St. Bonaventure, *anon.* (St. B 1386). Local in the State.

* ***Brassica napobrassica*** Mill. Railroad yards; occasional. Allegany, *S & F* 23638. The Rutabaga seems never to have become established in this State.

Hesperis matronalis L. Riverbottom woods; becoming common as elsewhere across the State. River islands below Red House, *S et al.* 23586; observed at Olean and Salamanca. Reported from the mouth of Fivemile Hollow (*Vecchierello*, 1940—42).

* ***Lunaria annua*** L. In shrubbery; occasional. St. Bonaventure, *M. F. Way* (St. B 1417). Only a few records for the State.

Nasturtium officinale R. Br. (*N. Nasturtium-aquaticum*). A second station: Allegany, *anon.* (St. B 1396).

* ***Raphanus sativus*** L. Railroad yards and roadsides; occasional. Near Ninemile, *E* (St. B 3103, 3104); observed at Allegany.

* ***Ribes sativum*** (Reichb.) Syme (*cf.* synonymy in Berger, 1924). Occasional near old houses and elsewhere. Limestone, *S et al.* 23522; open oak woods, Killbuck, *S & E* 26476; 1 mile southwest of Peth, *E et al.* (St. B 1468); observed at Salamanca. Compare the author's previous discussion (Smith, 1945).

* ***Lespedeza stipulacea*** Maxim. Railroad yards; occasional. Allegany, *S & F* 23658, 24299. Not found in flower, but the habit, texture of leaflets, prominent scarious stipules, markedly petiolate leaves and antrorsely pubescent stems all indicate this species (*cf.* Isely, 1948). Only a few stations in New York State, for which the investigator has seen no published records.

* ***Lotus corniculatus*** L. Appearing as a roadside plant; scarce, as yet. North of Steamburg, *S & F* 23223; observed near Mount Moriah.

* ***Vicia villosa*** Roth. Waste places; rare. Allegany, *anon.* (St. B 1672) (as *V. cracca*). Locally common in the State.

* ***Linum usitatissimum*** L. Railroad yards; occasional. Allegany, *S & F* 23644. The common flax is not infrequent along railroads; it seems never to have become established.

* ***Anethum graveolens*** L. Roadsides, etc.; occasional. St. Bonaventure, *E* (St. B 2402); Steamburg, *S et al.* 23730.

* ***Ipomoea purpurea*** (L.) Roth. Railroad yards; occasional. Allegany, *S & F* 23676. Several scattered stations across the State. It is difficult to determine whether this should be considered as an escape from cultivation or as a casual weed.

* ***Ajuga reptans*** L. Rare. A single plant in a low pasture, Tenmile Creek, *S & E* 24935. The species is making large colonies in other places in this small valley, spreading from plantings.

Veronica chamaedrys L. Ditches, roadside banks, lawns, etc.; frequent. Horseshoe, *S et al.* 23473; Salamanca, *S & E* 24951; south of Cold Spring, *S & E* 24959; observed at Riverside Junction, Killbuck and Frecks. Previously reported from Bee Hunter Run and English Run.

* **V. filiformis** Sm. Lawns; rare. Salamanca, *S & E* 24950. Local in the State (Muenscher, 1949).

* **Lonicera morrowii** Gray. Roadsides; occasional. Allegany, *S* 26252; observed at South Vandalia. Increasing in the State.

* **L. tatarica** L. Roadsides and streambanks; occasional. Observed at Allegany and Horseshoe. An old favorite, locally frequent in the State.

Artemisia absinthium L. Railroad yards; occasional. Allegany, *S & F* 23650. Reported from a pasture north of Randolph. Several stations in the State, but still local.

Bellis perennis L. Lawns; frequent. Allegany, *anon.* (St. B 2723); Salamanca, *S & E* 24949; observed at Frecks and Olean; reported from St. Bonaventure. Fernald's listing of this (1950) as an unnumbered genus and calling it merely an escape from cultivation does not accord with its frequency as a lawn weed at lower elevations in many parts of this State. It is even a question, in the author's mind, whether this "small-flowered" strain might not better be considered as definitely introduced as a weed, rather than as an escape.

* **Coreopsis grandiflora** Hogg. Spreading from cultivation; rare. Abundantly seeded on site of old nursery, east of Salamanca, *S & F* 23463. By comparison, plants of the Chinese balloonflower, *Platycodon grandiflorum* (Jacq.) DC., were thriving but were still in abandoned rows. There are only a few scattered stations for *C. grandiflora* in this State.

Helianthus tuberosus L. Weedy in low cultivated fields; local. Oldtown, *S et al.* 23493. Observed at Horseshoe and Quaker Bridge. The writer believes this was unquestionably introduced by the Iroquois. Hitherto reported only from Elko.

Inula helenium L. Wet old fields; local. Observed 0.7 mile east of Vandalia. Previously reported only from Randolph.

II. WEEDS

In the study of the floristics of any area, a consideration of the weed population is important. Some weeds never become established; others, once they have appeared in a region, spread rapidly. Some will out-compete most natives in the same general habitat. No representatives of the last category have yet been found in the Allegheny area. The assignment of the various taxa to the other two classifications is evident from the records cited.

Many weeds invade an area after disturbance of the native flora through cultivation and construction. With regard to certain species, one wonders whether they were originally native or whether they came into New York State through Indian agency. One such possibility is *Panicum capillare*, witchgrass. This problem will be difficult to solve, if not impossible, because of the scarcity of specimens of early date.

A number of these weeds are reported only from the railroad yards at Alleghany. They are doubtless also at many other spots along railroads and are indicative of a major source of introduction of weed species. Since most of the seeds of these species originally arrived in the area in shipments of grain, feed and other produce, they are also undoubtedly appearing on chicken farms and in garden patches in the general area.

Potamogeton crispus L. Ponds, sloughs, etc.; local. Observed at East Randolph. Previously reported from the vicinity of Quaker Bridge and from a gravelpit between Red House and Cold Spring. Considered locally abundant in the watershed (McVaugh, 1938).

Aristida dichotoma Mx. A rare weed of railroad yards and sidings. Carrollton, *S & F* 23442, 24501; Alleghany, *S & F* 23681. No specimens have been found to support the earlier report by Saunders (*cf.* House & Alexander, 1927). Not otherwise listed from western New York; occasional in western Pennsylvania.

* **Avena fatua** L. Railroad yards; rare. Alleghany, *S & F* 23688, 23689. The specific distinctness of this species and *A. sativa* L. is doubtful. The distinguishing characters (stoutness and geniculation of the awn and heaviness and coloration of the beard—*cf.* Chase, 1950) are all variable and not well correlated.

* **Bromus commutatus** Schrad. (*B. racemosus*, *p. p.*, of Gleason—1952). Weedy places; occasional. Alleghany, *S & F* 24317; across the river from St. Bonaventure, *S et al.* (St. B 3143); observed north of Steamburg and in the Conewango Valley. Frequent in the State.

* **B. japonicus** Thunb. Railroad yards; occasional. Alleghany, *S & F* 23682; Salamanca, *S & F* 23184. This chess is either spreading rapidly in the State or has been overlooked in confusion with related species. It is found along roads and railroads in many parts of the State.

* **B. mollis** L. (*B. hordeaceus* *auct.*). Railroads; rare. Quaker Bridge, *S et al.* 22725. Local in the State.

* **B. tectorum** L. Railroads and roadsides; frequent as elsewhere in the State. Alleghany, *S & F* 23684; *S & E* 24998. Observed north of Carrollton, at Salamanca and west of Red House.

* **Calamagrostis epigejos** (L.) Roth. Waste areas; rare. Near Salamanca, *Vecchierello*, August, 1943; east side of Salamanca, *S & F* 23798 (probably the same station). It is reported from Long Island and Saratoga County (Chase, 1950) and a colony has been seen in Putnam County.

* **Elymus indica** (L.) Gaertn. Railroad yards and curbsings; occasional. Allegany, *S & F* 24322; St. Bonaventure, *E* (St. B 3178). Frequent about cities and villages.

* **Elymus canadensis** L. Railroad yards; occasional. A large patch along the railroad, west of Allegany, *S & F* 23629; two fruiting culms in railroad yards, Allegany, *S & F* 23685. This is apparently new to the area, the earlier reports referring to *E. wiegandii* Fern. (p. 37). Not uncommon in the State as a native of dry habitats; local as a weed along railroads.

Eragrostis cilianensis (All.) Link (*E. megastachya*). Waste places; local. Observed at Allegany. Previously reported only from Salamanca.

E. multicaulis Steud. (*E. peregrina*; *E. pilosa*, p. p., of Gleason, 1952). Becoming frequent along railroads as in other areas, outside the mountains. Vicinity of Limestone, *S & F* 23175; Allegany, *S & F* 24320, 27999; Horseshoe, *S et al.* 27794; Salamanca, *S & F* 23185; observed at mouth of Tenmile Creek. The original report was from Quaker Bridge and there is a specimen labeled "Allegheny River, Allegany State Park," Kenoyer 9.

E. pectinacea (Mx.) Nees. An even commoner weed of roadsides and railroads. Vicinity of Limestone, *S & F* 23174; St. Bonaventure, *E* (St. B 3179); Allegany, *S & F* 23692, 24319; 2 miles east of Red House, *S* 23575; west of Steamburg, *S & Schumacher* 24362; Oldtown, *S et al.* 24482; observed at mouth of Tenmile Creek, Horseshoe and Steamburg. Previously reported only from East Randolph.

* **E. pilosa** (L.) PB. Roadsides; rare and local. Roadside, mouth of Tenmile Creek, *S & Ketchledge* 25837. The only other record from western New York State is from Collins, Erie County, *Perkins* 403; the species is rare in south central New York, the Hudson Valley and outer Long Island, but a number of collections are known from the vicinity of New York City. The citation by House and Gordon (1940) is in error, the specimen being *E. multicaulis* (*E. peregrina*) as originally reported by House and Alexander (1927).

E. pooides PB. Roadsides and railroads; becoming common here as elsewhere. Allegany, *S & F* 23693, 24321; Horseshoe, *S et al.* 23474; west of Steamburg, *S & Schumacher* 24363; observed at Steamburg. Previously reported only from Elko and the vicinity of Peth.

Festuca capillata Lam. (*F. ovina* var. *capillata*) Railroads; occasional. Red House, *S & F* 23182. Reported as chiefly on the higher ridges of the park area.

Hordeum jubatum L. Waste places; rare. Allegany, *anon.* (St. B 450). Reported from Salamanca. Observed by the writer in railroad yards at both places. Occasional to locally common in many parts of the State, but not persisting long.

* **Panicum dichotomiflorum** Mx. (incl. var. *geniculatum*—cf. Pohl, 1947). Weedy in railroad yards and along roads; becoming frequent. Allegany, *S & F* 24324; Tenmile Hollow, *E* (St. B 3175); west of

Steamburg, *S & Schumacher* 24366; observed at Killbuck and the mouth of Tenmile Creek. Also on gravelbars, where possibly native: Oldtown, *S et al.* 24486; observed at Horseshoe.

* ***P. virgatum*** L. var. ***spissum*** Linder. Railroads and roadsides; rare. Along railroad, west of Red House, *S & F* 23783. A second collection, *S & F* 23782, is transitional to var. *virgatum*. The species is reported from one mile north of Salamanca, *Alexander*, August 14, 1935. A collection by Alexander on that date, but labeled "near Red House," is in the State Museum; it has no basal parts. A duplicate (St. B 497) has long scaly rhizomes and is good var. *virgatum*. The relationship of the varieties is very intricate, being complicated by polyploidy (Nielsen—1945). Var. *spissum* is frequent in southeastern New York, particularly on Long Island, and is a frequent weed north to the vicinity of Albany and occasional elsewhere, mostly about railroads and in open, dry ground. Var. *virgatum* seems to be a scarce native in marshy areas in western New York and locally east to the central Hudson Valley and Lake George; it is rarely found as a weed.

Phalaris canariensis L. Waste places and cultivated garden beds; occasional. St. Bonaventure, *Vecchierello*, Sept. 8, 1943. Previously reported from east of Salamanca.

Poa compressa L. Waste places and cultivated areas; frequent. House and Alexander consider this "not common," but it was observed at many stations, apparently never making large colonies.

P. nemoralis L. Low woods; rare. Across river from St. Bonaventure, *S et al.* (St. B 3145); *E* (St. B 3140). Previously reported only from "east of the Park area," from which this station is also recorded.

* ***P. trivialis*** L. Swampy woods and along streams; infrequent. Riverside Junction, *S et al.* 23134; observed east of Vandalia, below Red House and at Frecks. Locally frequent in the State.

* ***Setaria faberi*** Herrm. Railroad yards; local as yet. Allegany, *S & F* 24326. Common in southeastern New York and north to Albany, spreading rapidly; occasional in central and western New York, to date.

* ***Sporobolus neglectus*** Nash. Railroad yards; rare. Allegany, *S & F* 24323.

* ***S. vaginiflorus*** (Torr.) Wood. Roadsides and railroad yards; becoming frequent. Mouth of Tenmile Creek, *S & Ketchledge* 25838; Riverside Junction, *S & F* 24505; Killbuck, *S & Ketchledge* 27733; East Randolph, *S et al.* 24462; observed at Oldtown. The first number cited is referable to var. *vaginiflorus*; all others belong to var. *inaequalis* Fern. Var. *vaginiflorus* is much more restricted in range in this State, but there seems to be no distinctive isolation. Both this species and the last frequently occur in waste places and seem to be increasing; the exact area of native occurrence, if any, in this State is extremely difficult to determine.

* ***Bulbostylis capillaris*** (L.) C. B. Clarke. Railroads; probably frequent. Allegany, *S & F* 23679; Carrollton, *S & F* 23425; Salamanca, *S & F* 24329; Red House, *S & F* 23180. This species ought to be found along railroads throughout western New York (*cf.* Smith, 1945), but there are only two other stations known to the author from

west of Keuka Lake: Lime Rock, Genesee County, *Watthews* 5295; Medina, Orleans County (observed by the writer).

* **Allium vineale** L. Railroad yards; rare. Allegany, *S* 24994. This species was reported from Limestone, but the specimen is *A. canadense* L. Locally abundant in the State.

* **Epipactis helleborine** (L.) Crantz (*E. latifolia*). Rare in the region to date. Observed at Riverside Junction. Stations cited by Eaton *et al.* (1956) are from outside the area.

Polygonum convolvulus L. Railroad yards, gravelbars, etc.; a few more stations. Allegany, *S* & *F* 23662; observed at Carrollton and on the islands below Red House. Common in the State.

* **P. lapathifolium** L. var. **prostratum** Wimmer. Railroad yards; rare. Allegany, *S* & *F* 23663. Locally frequent in the State about railroads and curbing. This taxon, with its short, broad, blunt leaves, strikingly blotched with dark purple, its stubby inflorescences and sprawling growth, is easily distinguished. The writer has no idea what its value as a major race may be.

Rumex crispus L. Common, as elsewhere in the State. Southern Ninemile Creek, *E* (St. B 3077, *p. p.*); Elko, *S et al.* 22776; observed at seven other stations.

* **R. triangulivalvis** (Danser) Rech. f. (*R. mexicanus* auct., at least for the most part—Rechinger, f., 1937). Railroad yards; occasional. Observed at Allegany. Becoming frequent in the State. This species might be treated as a subspecies of *R. mexicanus* Meisn., to which it is closely allied.

Chenopodium gigantospermum Aellen (*C. hybridum* auct. amer.—Wahl, 1954). Waste places; rare. Allegany, *S* & *F* 24311. Previously reported only from the grounds of the Allegany School of Natural History. This species is native to New York but frequently appears as weedy.

* **Kochia scoparia** (L.) Schrad. Railroad yards; rare. Allegany, *S* & *F* 23670, 24312. Occasional to frequent in this habitat in the State; becoming abundant on the sandplains west of Albany.

* **Salsola kali** L. var. **tenuifolia** G. F. W. Meyer. Railroad yards; rare. Allegany, *S* & *F* 23671. Becoming frequent along railroads and in waste places at lower elevations in the State.

* **Amaranthus albus** L. Waste places; occasional. Allegany, *S* & *F* 23667; Limestone, *S* & *F* 23150.

* **A. hybridus** L. Railroad yards; occasional. Allegany, *S* & *F* 24302, 24303.

* **A. powellii** Wats. Railroad yards; occasional. Allegany, *S* & *F* 23665, 23666. These three species, or at least the first two, are probably frequent in cultivated fields and gardens, but no other observations were made. The first two are common in many parts of the State and the third is locally so.

* **A. tamariscinus** Nutt. (*Acnida tamariscina*—Sauer, 1955). Railroad yards; rare. Allegany, *S* & *F* 24306 (pistillate), 24304, 24305, 24307, 24308, 24309, 24310 (staminate). The staminate plants were variable in appearance, but all had the bracts and outer perianth-segments prominently nerved and spinose-tipped and the bracts half as long

as the perianths. The species is becoming frequent in railroad yards in several cities of the State.

* **Mirabilis nyctaginea** (Mx.) MacM. (*Oxybaphus nyctagineus*). Railroad yards; rare. A single plant, Allegany, *S & F* 24295. Otherwise becoming common in the State at low elevations.

Portulaca oleracea L. Waste places; probably frequent. Railroad yards, Allegany, *S & F* 23661; Cold Spring, *Fenton* 205. The only previous reports were from Quaker Bridge and St. Bonaventure. Common in the State.

* **Arenaria serpyllifolia** L. Along railroads; probably frequent. Observed at Allegany and at Elko. Common in the State.

* **Sagina procumbens** L. Railroad yards; rare. Salamanca, *S & F* 24328. Occasional to frequent at lower elevations in the State, although once considered infrequent to rare; Warren County, Pa.

Silene cucubalus Wibel (*S. latifolia*). Waste places; increasing. Allegany, *anon.* (St. B 1256); *S & F* 24300. Becoming common in many parts of the State.

* **Vaccaria segetalis** (Neck.) Garcke (*Saponaria vaccaria*). Railroad yards; occasional. Allegany, *S & F* 24301. Occasional in the State as well.

Ranunculus repens L. Ditches, sloughs and gravelbars; probably frequent. Horseshoe, *S & E* 26357, 26359; river islands below Red House, *S & E* 23585; observed about Vandalia and in Tenmile Hollow. No. 26357 is referable to var. *glabratus* DC., and the handsome sterile f. *pleni florus* (Fern.). House is also present (p. 23). Reported from St. Bonaventure. Infrequent in the State.

Alliaria officinalis Andrz. Wooded banks; rare. Salamanca, *S & F* 24327; *S & E* 26523. Reported from St. Bonaventure. Spreading in the State.

* **Arabis glabra** (L.) Bernh. Roadsides; rare. Roadside, Allegany State Park, *Gordon* (St. B 1409). Previously reported as the native *A. drummondii* Gray.

Brassica juncea (L.) Coss. Railroads; occasional. Allegany, *S* 23637; *S & F* 24292; Limestone, *S & F* 23144. Reported only from Quaker Bridge.

* **Camelina microcarpa** Andrz. Railroad yards; occasional. Allegany, *S & F* 24987. Becoming frequent in central and western New York.

* **Cardamine pratensis** L. subsp. *pratensis* (subsp. *typica* Clausen, 1949). Lawns and alluvial woods; becoming frequent. St. Bonaventure, *E et al.* (St. B 1407); Horseshoe, *S & E* 26365; Salamanca, *S & E* 24948; lakeshore, Allegany State Park, *Yackovich et al.* (St. B 1406); observed west of Allegany. Becoming frequent in many parts of the State.

* **Descurainia sophia** (L.) Webb. Railroad yards; occasional. Allegany, *S & F* 23635, 24290; *S* 24986. Increasing in the State.

* **Erucastrum gallicum** (Willd.) O. E. Schultz. Railroad yards; occasional. Allegany, *S & F* 23636, 24291. Increasing in many parts of the State.

* **Erysimum repandum** L. Railroad yards; occasional. Allegany, *S* 24985. Rare in the State.

* **Lepidium perfoliatum** L. Railroad yards; occasional. Allegany, *S & F* 23640. Also rare in the State.

* **L. virginicum** L. var. **virginicum**. Railroads and roadsides; probably frequent. St. Bonaventure, *E* (St. B 3102); southern Ninemile, *E* (St. B 3101). Common in many parts of the State.

* **Raphanus raphanistrum** L. Roadsides and gravelbars; spreading as elsewhere. North of Cold Spring, *S et al.* 23785; west of Steamburg, *S & Schumacher* 24361; observed both east and west of Red House and on the islands downriver. Becoming a pest in some parts of the State.

* **Rorippa sylvestris** (L.) Bess. Rivershores; becoming frequent as elsewhere in the State. Carrollton, *S & F* 23382; river islands below Red House, *S et al.* 23588; Quaker Bridge, *S & F* 23479; observed at Riverside Junction, Horseshoe, Killbuck and north of Wolf Run.

* **Thlaspi arvense** L. Along railroads and in abandoned garden plots; scarce. Allegany, *S & F* 23639; *S & E* 24989; Tenmile Road, *E* (St. B 3106, 3107); Quaker Bridge, *Alexander & House* 12828a. Appearing in many parts of the State.

* **Polanisia dodecandra** (L.) DC. subsp. **dodecandra** (*P. graveolens*—Iltis, 1958). Weed in gardens; rare. St. Bonaventure, *Vecchierello* (St. B 1387). Local in the State; in part, native.

Sedum triphyllum (Haw.) S. F. Gray (*S. purpureum*; *S. telephium* of Gleason, 1952). Occasional in waste places. Elko, *S et al.* 22762; observed at Carrollton, Horseshoe and mouth of State Line Run. Previously reported only from Holts Run. The writer is accepting the nomenclature of Clausen (1949), who is monographing the genus.

* **Potentilla argentea** L. Waste places; rare (?). Allegany, *anon.* (St. B 1540). Not observed by the writer or previously reported. Frequent in many parts of the State.

P. recta L. Waste places and fields; increasing. Observed at Allegany, Carrollton and opposite Red House. Locally abundant at lower elevations in the State.

* **Cassia fasciculata** Mx. Railroad yards; occasional. Allegany, *S & F* 23657. This species is locally frequent as a native in southeastern New York, but rare elsewhere in the State.

Melilotus albus Desr. Waste places; infrequent. Allegany, *anon.* (St. B 1691); observed at Carrollton and south of Peth. Originally reported only from north of Quaker Bridge.

* **M. altissimus** Thuill. Railroads; rare. Salamanca, *Alexander* (St. B 1643). This was originally reported as *M. officinalis*. Infrequent in the State.

* **M. officinalis** (L.) Desr. Railroad yards; rare. Observed at Allegany. Distinctive in its corrugated fruits. The statewide distribution of these two yellow-flowered sweet clovers is poorly known, because of confusion between them.

* **Strophostyles helvola** (L.) Ell. Railroad yards; rare. A single plant of this characteristic species with lobed leaflets was observed at Allegany, but it was destroyed before reaching proper stage for collecting. A frequent native along the coast, along the lower Hudson River and about the Great Lakes.

* **Vicia cracca** L. Railroad yards; rare. Observed at Allegany. Locally frequent in many parts of the State. Reported from Quaker Bridge, but the specimen, while of doubtful identity, is not this species.

* **Geranium pusillum** L. Flowerbeds; rare. St. Bonaventure, *S & E* 26254. Gradually increasing in the State. It should be mentioned here that small plants of a species of cranesbill with neither flowers nor fruits were collected (*S et al.* 23492, 23793) or observed on several occasions in a cornfield at Oldtown. This investigator suspects them of being the native *Geranium carolinianum* L. var. *confertiflorum* Fern., which has been found in similar habitats in Chemung County.

Polygala sanguinea L. (*P. viridescens*). Fields and roadside banks; scarce. Mouth of Tenmile Creek, *S & Ketchledge* 25835; Horse-shoe, *S et al.* 27747. Previously reported only from Butler's Run. The specimen from Portville, east of the map area, cited as *P. incarnata* L., also belongs here. Becoming increasingly common in the State.

* **Abutilon theophrasti** Medic. Railroad yards; occasional. Allegany, *S & F* 23643. Becoming frequent in cultivated fields throughout much of the State.

Hibiscus trionum L. Waste places; occasional. Allegany, *anon.* (St. B 1837, 1838); *S & F* 23642. Reported from St. Bonaventure. Increasing in the State, but local.

* **Malva rotundifolia** L. Railroad yards; rare. Allegany, *S & F* 24296. This is the first specimen the writer has identified from New York State, although the species may have been overlooked or not separated from the common *M. neglecta* Wallr., which long passed as *M. rotundifolia*.

Viola arvensis Murr. Fields and waste places; increasing. Hills, Allegany, *anon.* (St. B 1920); railroad yards, Allegany, *S* 24991. Reported from the vicinity of Vandalia and Steamburg.

* **Oenothera laciniata** Hill var. *laciniata*. Railroad yards; occasional. Allegany, *S & F* 24294. Scattered stations about the State. Apparently native just west of area.

* **Convolvulus arvensis** L. Railroad yards; rare. Observed at Allegany. Locally abundant in the State.

* **Ipomoea hederacea** Jacq. Railroad yards; occasional. Allegany, *S & F* 23677. Known from a few stations across the State.

* **Echium vulgare** L. Railroad yards and waste places; occasional. Allegany, *S & F* 23672; head of Fivemile Road, *E & Liegey*, Oct. 23, 1956 (St. B). The scarcity of lime may account for the rarity of this species in the area.

* **Verbena bracteata** Lag. & Rodr. Railroad yards; occasional Allegany, *S & F* 23678. Rare in the State, but known from several counties.

* **Datura stramonium** L. Railroad yards; occasional. Allegany, *S & F* 23674, 24313. Infrequent in the State, but known practically throughout the lowlands.

Solanum americanum Mill. (*Solanum nigrum auct.*, p. p.). Rare as a native and rare as a weed. Railroad yards, Allegany, *S & F* 24314. Infrequent in the State.

* **S. rostratum** Dunal. Railroad yards; occasional. Allegany, *S & F* 23675, 24315. Occasional in many parts of the State.

* **Veronica anagallis-aquatica** L. subsp. **anagallis-aquatica** (Hultén, 1958). Muddy shores; rare as yet. Horseshoe, *S & E* 26414; East Randolph, *S et al.* 24452. Not listed from the watershed (McVaugh, 1938). Becoming frequent in the lowlands of the State.

* **V. arvensis** L. Old fields, roadsides and lawns; probably frequent. St. Bonaventure, *S & E* 24859; observed at Frecks. Frequent in the State, outside of the mountains.

V. peregrina L. subsp. **peregrina** (subsp. *typica* Pennell, 1935). Lawns and waste places; probably frequent, but overlooked. St. Bonaventure, *S & E* 24858, 24940; observed at Frecks. Previously reported only from grounds of the Allegany School of Natural History.

* **V. serpyllifolia** L. subsp. **humifusa** (Dickson) Piper (Piper, 1906) (*V. tenella*). Lawns and old fields; scarce. Pasture, Mount Moriah Swamp, *S & E* 26292; Tenmile Creek, *S & E* 24934. Also collected in moist pasture two to two and one-half miles south of Ischua (to the northeast), *S & E* 24912. Rare in the State. All these specimens are larger than ordinary subsp. *serpyllifolia* with more deeply colored corollas and spreading pubescence. However, in every case, they were growing with ordinary plants of that taxon and others which were typical of it except for being more robust than usual. Variations in intensity of coloration of corolla and disposition of pubescence (stems not spreading-pubescent, stems spreading-pubescent only in inflorescence, stems spreading-pubescent both in inflorescence and below) were noted. If isolation is ever effective, it does not appear so here. Boivin (1952) typifies *V. serpyllifolia* on the element referable to var. *borealis* Laest., which is synonymous with this subspecies. He refers to Hegi (1918). Hegi, however, has three varieties. Pubescence is not emphasized as distinguishing any of them. The description of the color of the corolla of var. *typica* Beck is not correct for this subspecies and Hegi also recognized var. *tenella* (All.) Beck, the basionym of which Boivin refers to the synonymy of this taxon, his var. *serpyllifolia*.

* **Plantago aristata** Mx. Railroad yards; occasional. Allegany, *S & F* 23641. Scattered and locally abundant across the State, except for the mountains and the valleys north of the Adirondacks.

* **Diodia teres** Walt. Railroad yards; occasional. Allegany, *S & F* 24293. Frequent on Long Island and Staten Island; six scattered stations above New York City. Not listed by Zenkert; the nearest county in northeastern Ohio.

Dipsacus sylvestris Huds. Old fields; local. Observed at Killbuck and Oldtown. Reported from Onoville. Common in the State.

* **Anthemis arvensis** L. Waste places and gardens; rare, according to collections, but probably overlooked. Allegany, *anon.* (St. B 2763).

A. cotula L. Waste places; probably frequent. St. Bonaventure, *E* St. B 2764; Allegany, *S & F* 23649; southern Ninemile Hollow, *E* (St. B 3223). Previously reported only from Quaker Bridge.

Artemisia biennis Willd. Railroad yards; occasional. Allegany, *S & F* 23653. Cited as escaped near Elko. Infrequent in the State.

* **A. vulgaris** L. About railroads; local. Allegany, *S & F* 23651, 23652; south of Peth, *S et al.* 27800; Elko, *S et al.* 22760. Becoming frequent in the lowlands of the State.

* **Centaurea jacea** L. subsp. **jacea** (Clausen, 1949). Old fields; rare. Camp Carlton, Allegany State Park, *Hicks* (St. B 2795). Previously reported as *C. nigra*. Locally frequent in the State.

* **C. jacea** L. subsp. **eunigra** Gugler (*C. nigra*—Clausen, 1949). Old fields; rare. YMCA Camp Fancher, Allegany State Park, *Gordon* (St. B 2796). Also reported from the vicinity of Olean.

* **C. maculosa** Lam. Railroad yards; occasional. Allegany, *S & F* 23654. Rapidly spreading in many parts of the State.

* **Coreopsis tinctoria** Nutt. Railroad yards; occasional. Allegany, *S & F* 23648. This species is apparently an adventive, rather than an escape from cultivation.

* **Crepis capillaris** (L.) Wallr. Fields and lawns; scarce. St. Bonaventure, *E* (St. B 3215, 3216); Red House Lake, *S et al.* 23714; observed west of Steamburg. Becoming frequent in central and western New York State and about New York City; rare elsewhere.

Galinsoga ciliata (Raf.) Blake. Waste places; occasional. St. Bonaventure, *E* (St. B 3218); observed in railroad yards, Allegany. Reported from Salamanca. Increasing in the State.

* **Helianthus petiolaris** Nutt. subsp. **petiolaris** (Heiser, 1958). Railroad yards; occasional. Allegany, *S & F* 23647. Appearing in railroad yards in several cities of the State.

* **Hypochaeris radicata** L. Railroad yards; occasional. Allegany, *S & F* 23655. Infrequent in the State.

Leontodon autumnalis L. (*Apargia autumnalis*). Oil fields and waste places; spreading. East Randolph, *S et al.* 24450; observed on south side of Conewango. Reported from St. Bonaventure and the environs of Limestone. Locally frequent in the State.

Matricaria matricarioides (Less.) Porter (*M. suaveolens*). Spreading rapidly in waste places and along roads as elsewhere in the State. Vicinity of Limestone, *S & F* 23145; Allegany, *S & F* 24298; observed at Red House, north of Quaker Bridge and south of Conewango. Reported, hitherto, only from "Allegany State Park."

Sonchus arvensis L. var. **arvensis**. Waste places; occasional. Steamburg, *S et al.* 23729. Previously reported only from Big Basin. The species is considered as locally abundant in the State and the typical variant as the more common of the two (Muenscher, 1935).

* **S. arvensis** L. var. **glabrescens** Guenth., Wimm. & Grab. (incl. *S. uliginosus*). Waste places; occasional. Railroad yards, Allegany, *S & F* 23656; observed at Salamanca. This taxon is reported (Shumovich & Montgomery, 1955) as tetraploid and var. *arvensis* as hexaploid. Their study, however, showed that the difference in chromosome-number was not an absolute barrier.

* **Tragopogon dubius** Scop. (*T. major*). Waste places; rare. Red House, *Alexander & House* 13128, reidentified by House. This is apparently the basis of the single cited station for *T. pratensis*. Spreading in the State.

* **T. pratensis** L. Waste places; infrequent. Observed west of Allegany and at Carrollton. Distinctive by its slender peduncles and short bracts. Locally abundant in the State.

III. NATIVE PLANTS

Despite the evidence of awareness of introduced species reported in the first two sections of this paper, the writer is particularly interested in the native plants and their geography. He is here reporting such as are new, rare or otherwise interesting. There are obviously some groups still to be collected and studied in detail, such as *Crataegus*, *Rubus* and *Viola*.

The most notable additions were made in the upland oak woods and the alluvial bottomlands. The former produced a number of species of more austral range; the latter yielded some taxa of more austral and more midwestern range. The valley of Conewango Creek, marginal to the area on the northwest, harbored a few items of calciphile tendencies. One of the striking features noted was the pairing of related taxa in distinctive habitats: *Arisaema triphyllum* subsp. *stewardsonii* in bottomlands and *A. triphyllum* subsp. *triphyllum* in uplands; *Uvularia perfoliata* in oak woods as opposed to *U. grandiflora* in mixed hardwoods; *Asarum canadense* var. *reflexum* in bottomlands with *A. canadense* var. *canadense* in uplands.

The other pleasant surprise was in the discovery of several new Alleghenian elements, the presence of which was foreshadowed by the frequency of *Clintonia umbellulata*. Among these should be noted: *Lilium canadense* subsp. *editorum*, *Baptisia tinctoria* var. *projecta* and *Chelone glabra* subsp. *elatior*. Detailed search should reveal more stations for these and probably still other Alleghenian types.

Taxus baccata L. subsp. **canadensis** (Marsh.) Pilger (*T. canadensis* —Clausen, 1949). Swamps and moist wooded slopes; some additional stations. Vicinity of Peth, *E* & *Piorkowski*, Aug. 25, 1955 (St. B); *E* *et al.* (St. B 342); observed at Mount Moriah Swamp.

Abies balsamea (L.) Mill. Wet woods; another station. Mount Moriah Swamp, *E* *et al.* (St. B 348). Previously reported only from Balsam Swamp, Red House. Local in central and western New York.

Typha latifolia L. Ditches and swales; local. Krampf's Pond, Ten-mile Road, *E* (St. B 3034); observed north of Riverside Junction, opposite Red House, around Steamburg, east of Blacksnake Mountain. Apparently, the frequency is governed by a lack of suitable habitats. Considered common by McVaugh (1938) but rare by House and Alexander.

Sparganium eurycarpum Engelm. Marshes and sloughs; a second station. Observed at Horseshoe. Reported only from Randolph. Common in lakes of the watershed (McVaugh, 1938).

* **Potamogeton perfoliatus** L. subsp. **bupleuroides** (Fern.) Clausen (Clausen, 1949). Rivershores; rare. Horseshoe, *S* *et al.* 27782; stranded on shore of island below Red House, *S* *et al.* 23612. Not reported from the Allegheny (McVaugh, 1938). A specimen from Olean, *E* (St. B 403) was reported as *P. richardsonii* (Benn.) Rydb. The vegetative characteristics of this specimen are considered by Ogden to be transitional to those of *P. perfoliatus* as in other eastern material studied by him (Ogden, 1943).

* **P. spirillus** Tuck. Ponds; rare. Krampf's Pond, Tenmile Road, E (St. B 3035, 3036). Locally abundant in the watershed (McVaugh, 1938).

Alisma plantago-aquatica L. var. **parviflorum** (Pursh) Farw. (*A. subcordatum*). All identifiable specimens of this species seem to be of this taxon, characterized, *inter aliis*, by small flowers, small achenes and narrowly margined sepals. There is considerable disagreement on the status and distribution of the Water Plantains related to typical European *A. plantago-aquatica* (cf. Fernald, 1946; Hendricks, 1957; Samuelson, 1932; Wiegand & Eames, 1926).

Elodea nuttallii (Planch.) St. John (*E. occidentalis*; *Anacharis nuttallii*). Ponds and margins of streams; rare. Horseshoe, S *et al.* 26415. Reported from East Randolph. Not listed by McVaugh (1938).

Agropyron trachycaulum (Link) Malte. Oak woods; occasional. Southwest of Quaker Bridge, S & F 24498. The only other specimen seen from the area is that from the slope opposite Red House. Both specimens are referable to var. *glaucum* (Pease & Moore) Malte. Rare in western New York.

* **Agrostis stolonifera** L. var. *stolonifera* (*A. alba* auct., p. p.; *A. stolonifera* auct., p. p.—Philipson, 1937). Along streams; frequent. Across river from St. Bonaventure, S *et al.* (St. B 3154); Limestone, S & F 23170; Red House Creek Valley, Alexander & House 12637; observed on west side of Allegany, west of Vandalia, Horseshoe, on north side of Salamanca, at the East Randolph Fish Hatchery and on the islands below Red House. This species is characterized by lack of scaly rhizomes, by rooting at the nodes of the decumbent basal parts of the flowering stems and by the contracting of the panicle-branches and branchlets after anthesis. On streamsides or gravelbars, it frequently develops long prostrate leafy shoots which root near the base. Frequent in the State.

* **Andropogon gerardii** Vitman (*A. furcatus*). Riverbottom fields; scarce. Observed at Oldtown and Horseshoe. Reported from Olean Rock City to the east; considered frequent in western New York.

* **Andropogon virginicus** L. var. **virginicus**. Old fields; rare. Slope bordering Red Pond, S. *et al.* 23777; S & Schumacher 24392. Common on the coast of New York but rare upstate. Known from the eastern Great Lakes Plains northeast to Erie County, Pa.; new to the High Upland of Jennings' region.

* **Brachyelytrum erectum** (Schreb.) PB. var. **erectum**. Oak woods; rare. Tenmile Hollow, E (St. B 3188). As yet, there are no other morphological characters correlated with that of pubescent lemmas. However, it should be noted that this variety is common in New York State only in the vicinity of New York City. All other stations are scattered and mostly at lower elevations along the larger streams or lakes. The var. *septentrionale* Babel, with glabrous to scabrous lemmas, is the common representative in New York State, as it is here, and is equally as common as var. *erectum* around New York City.

Bromus ciliatus L. Oak woods; possibly rare and certainly not common as indicated. The only two specimens seen are: west of Red House, S *et al.* 24433; Elko Mountain, Alexander, August 31, 1926.

* **Echinochloa muricata** (PB.) Fern var. **muricata** (*E. pungens*—Fairbrothers 1956). Rivershores and ditches; frequent. Horseshoe, *S et al.* 27797; roadside ditch west of Steamburg, *S & Schumacher* 24368; Oldtown, *S et al.* 24488; Elko, *S et al.* 24473. Known from Warren County, Pa.

* **E. muricata** (PB.) Fern. var. **microstachya** Wiegand (*E. pungens* var. *microstachya*; *E. microstachya*—cf. Wiegand & Eames, 1926). Gravelbars along the river; occasional. Horseshoe, *S et al.* 27798; Oldtown, *S et al.* 24489. Reported from Chautauqua County. None of the older specimens of cocksbur grass, which were seen by the author, belongs to either race of this native species. Records in the herbarium of the New York State Museum indicate that both races are frequent in western New York as in central.

Elymus villosus Muhl. Along the larger streams; probably frequent. Islands below Red House, *S et al.* 23624; mouth of State Line Run, *S & F* 23236. Observed at Limestone, Horseshoe, Killbuck and Oldtown. Reported from Riverside Junction and the vicinity of Peth. This never seems to form large colonies in this State but occurs as occasional clumps among other grasses.

Elymus wiegandii Fern. (incl. in *E. canadensis* by Gleason, 1952, and Chase, 1950). Riverbottom woods; abundant there. Islands below Red House, *S et al.* 23622; Quaker Bridge, *S & F* 23488. Observed at Riverside Junction, Horseshoe, Oldtown and the mouth of State Line Run. Also reported, as *E. canadensis*, from the vicinity of Elko and Great Valley Creek, one mile south of Peth. On a canoe-trip from Red House to Quaker Bridge, one of the most conspicuous sights all along the route on both islands and shores was the large pale pendent plumes of this species. Despite its showiness, the species has been overlooked in many parts of the State.

* **Eragrostis frankii** C. A. Mey. Gravelly soil; rare and possibly introduced. Weedpatch, East Randolph Fish Hatchery, *S et al.* 24461; roadside, Oldtown, *S et al.* 24483; gravelbars, Oldtown, *S et al.* 24484. Local in the State. Many of the collections of this uncommon species seem to be from disturbed habitats.

E. hypnoides (Lam.) BSP. Muddy shores of the Allegheny and similar habitats; probably frequent in such places. Gravelpit, Russell, *E*, Sept. 23, 1956 (St. B); Horseshoe, *S et al.* 27795; west of Red House, *S et al.* 24434; Oldtown, *S et al.* 24485; near Onoville, *Gordon* (St. B 436); observed on islands below Red House. Previously reported only from the mouth of Red House Creek. This species is local in the State but is usually overlooked.

Glyceria canadensis (Mx.) Trin. Swamps; locally abundant and not restricted to the bogs at the edge of the glacial drift as stated earlier. Bottoms of the Tunungwant Creek near Limestone, *S & F* 23173, 23539; swale at Carrollton, *S & F* 23450.

* **G. septentrionalis Hitchc.** Swales and swamps; frequent in the lowlands. Vicinity of Limestone, *S & F* 23172, 23537; Carrollton, *S & F* 23449; two and one-half miles north of Riverside Junction, *S & F* 23189; observed north of Randolph and at the bogs north of Steamburg. Marginal collections are from west of Leon, *S et al.* 22613, and Cherry Creek, Chautauqua County, *S et al.* 22636, and it has been

observed at Portville on the Allegheny River to the east. Reported from Celeron to the west. Although it is a prominent element of the flora, being particularly showy in the Conewango Creek Valley and abundant in low ground about Randolph, this handsome grass with its large spikelets has been previously overlooked, possibly because of its early shattering of spikelets. Rare in eastern and southeastern New York; not uncommon from Utica and Greene (Chenango County) westward.

* *Muhlenbergia frondosa* (Poir.) Fern. (*M. mexicana* auct.). On gravelbars; also weedy in curbsings; frequent. Horseshoe, *S et al.* 27792; Randolph, *S et al.* 24438; islands below Red House, *S et al.* 23626; observed in railroad yards at Allegany and along a small stream on the west side of Allegany. Considered infrequent in western New York.

* *M. mexicana* (L.) Trin. (*M. foliosa* auct.). Ditches; a single collection. Near Randolph, *S et al.* 24437. Probably overlooked. Considered frequent in western New York; sparing on the High Plateau.

* *M. schreberi* Gmel. Weedy as elsewhere in the State; probably frequent. Railroad yards, Allegany, *S & F* 24318; curbing, Randolph, *S & F* 24439. Infrequent in Zenkert's area; not common on the High Plateau.

* *M. sylvatica* Torr. Oak woods; rare. Seepage-run on steep slope, Killbuck, *S et al.* 27731. Locally frequent in the largest valleys of the State but rare elsewhere; infrequent in western New York.

* *M. tenuiflora* (Willd.) BSP. Oak woods; rare as elsewhere in western New York. With the last, *S et al.* 27732. The ranges of this and *M. sylvatica* are nearly identical in this State.

Panicum capillare L. Disturbed soil in the larger valleys; common. Railroad yards, Allegany, *S & F* 23695; one-quarter mile east of Vandalia, *E* (St. B 3174); Riverside Junction, *S et al.* 23138; observed at mouth of Tenmile Creek, Killbuck, Steamburg and Oldtown. Weedy as always in the State. House and Alexander reported it only from the valley of the Tunungwant Creek and suggested that it was not native. This is one of the annual species of disturbed situations which become much more abundant on soil cultivation. Whether it is an old species of the area, once restricted to small exposed areas after temporary disturbances and now more widespread, or whether it came as a weed in Indian cultivation is a problem that applies to the whole State.

* *P. gattingeri* Nash (*P. capillare* var. *campestre*). Gravelbars and roadsides; frequent. Mouth of Tenmile Creek, *S & Ketchledge* 25839; west of Steamburg, *S & Schumacher* 24367; Oldtown, *S et al.* 24487. Rare in western New York. Another witchgrass which may be introduced or may be native, preferring disturbed soils.

P. latifolium L. Sparse in dryish oak woods; a few more stations. Riverside Junction, *S et al.* 23139, 23140; north of Quaker Bridge, *S et al.* 22597; observed east of Vandalia, at Killbuck and southwest of Quaker Bridge. The two earlier stations were on the west edge of the park.

P. linearifolium Scribn. Old fields; a new station. Carrollton, *S et al.* 23456. This is referable to var. *wernerii* (Scribn.) Fern., a distinctive variant, but one without apparent isolation. Earlier localities cited for the species (including both varieties) were all from below Steamburg

and Red House.

* ***P. philadelphicum*** Bernh. Gravelbars; rare (?) Horseshoe, *S et al.* 27796. The specimens belong to var. *tuckermanii* (Fern.) Steyermark & Schmoll (*P. tuckermanii*—Steyermark & Schmoll, 1939). This variety seems to favor borders of alluvial swamps and gravelbars. The few specimens of var. *philadelphicum* observed by the author seem to be from more sterile and drier upland soils; an ecotype difference may be involved. The variety is apparently a new find for that part of New York State west of Cayuga Lake. The species is otherwise known in that same part of the State by var. *philadelphicum* from Windom, Erie County, *F. W. Johnson*, October 19, 1924.

* ***Paspalum ciliatifolium*** Mx. Old fields; rare as elsewhere upstate. Red Pond, *S & Schumacher* 24391. The material belongs to var. *muhlenbergii* (Nash) Fern. The nearest stations in New York are in northern Livingston County and eastern Monroe County; Jennings does not report it from northwestern Pennsylvania.

Phalaris arundinacea L. Bottomlands; common in the valley of the Allegheny River and the flats around Randolph. Hemlock Swamp near Quaker Bridge, *Saunders* (St. B 488, 489); observed at Riverside Junction, Carrollton, Horseshoe, Salamanca, Steamburg, Randolph, north of Randolph and at mouth of State Line Run. The only previous report seems to be "Alleghany State Park" with no further designation.

Poa alsodes Gray. Rich woodlands, including those on the bottoms; common. East of Russell, *S & E* 26265; Bradford (Riverside) Junction, *Wiegand* 15226 (Specimen at Cornell University); Horseshoe, *S & E* 26450; observed at South Vandalia Oxbow, Tenmile Hollow, Elko and Frecks. This is one of the earlier grasses to mature and shatters quickly, which may account for its being overlooked previously. The only citation was, again, "Alleghany State Park."

* ***P. languida*** Hitchc. Dry oak woods; a single station. Riverside Junction, *S et al.* 23130. Frequent in western New York; missing from northwestern Pennsylvania. This species is very close to *P. saltuensis* and varies in practically all the differentiating characters (Clausen, 1939). This is the only specimen found which is good *P. languida*. All others are *P. saltuensis* or transitional.

P. saltuensis Fern. & Wieg. Dry oak woods; apparently frequent. St. Bonaventure, *S & E* 24945; Killbuck, *S & E* 26503; Elko, *S et al.* 22787; observed at Riverside Junction. Rarer in more mesic habitats: Horseshoe, *S & E* 26451; observed along lower Tenmile Creek. Reported as occasional, "especially along Quaker Run." Rather rare in western New York and in the area just south.

Spartina pectinata Link. Riverbanks; not as rare as previously indicated. Horseshoe, *S & E* 26455; *S et al.* 27799; observed at Quaker Bridge. Reported only from a locality just one mile north of this station. A large clump of grass, west of the village of Alleghany, in a weedy area, was dense enough to simulate one of the big tussock grasses; it never flowered, but a specimen (*S & F* 23630) had the ligules, collars and blades of this species. Rare in western New York.

* **Sphenopholis intermedia** (Rydb.) Rydb. Oak woods; rare or overlooked. Riverside Junction, *S et al.* 23126; observed at Carrollton. This species, like the next, never seems to occur in abundance in any locality in this State. Frequently, there will be but a plant or two and they shatter quickly. Rare in western New York.

* **S. nitida** (Biehler) Scribn. Oak woods; rare or overlooked. Riverside Junction, *S et al.* 23127, 25029; observed east of Vandalia. Rare in western New York.

* **Carex albursina** Sheldon (*C. laxiflora* var. *latifolia*). Rich woods; occasional. East of Russell, *E et al.*, May 20, 1958 (St. B). Notes on ranges of species of *Carex* relatively frequent at lower elevations across the State are omitted.

C. amphibola Steud. var. **turgida** Fern. (*C. grisea* auct.). Low woods; four more stations, all in the valleys east and southeast of Salamanca. East of Vandalia, *E*, June 4, 1956 (St. B); South Vandalia Oxbow, *S & E* 26329; Carrollton, *S & F* 23428; Horseshoe, *S & E* 26430. Reported only from Limestone.

C. annectens (Bickn.) Bickn. Fields; occasional, but possibly more frequent than apparent, due to confusion with *C. vulpinoidea* Mx. Harrisburg, *S et al.*, July 26, 1956 (St. B); St. Bonaventure, *E et al.* (St. B 562); Riverside Junction, *S & F* 23123; Tenmile Hollow, *E*, June 27, 1956 (St. B); Bear Bog, south of Halls, *S et al.* 22809. These specimens are all var. *annectens*. A specimen from a dry old field, two miles east of Red House, *S* 23181, is clearly var. *xanthocarpa* (Kük.) Wieg. (*C. brachyglossa*—cf. synonymy, Mackenzie, 1931-35). A specimen from Carrollton, *S & F* 23437, and those previously reported as *C. brachyglossa* seem transitional.

* **C. areta** Boott. Swales; rare. Carrollton, *S & F* 23438. This species is one of the rarest in the State. There are only two other stations represented in the herbarium of the New York State Museum: vicinity of Axton, Franklin County, Rowlee *et al.*, July 11, 1899, and Truxton, Cortland County, Wiegand, June 1896. Jennings does not record this species and neither Mackenzie (1931-35) nor Hermann (1954) cites it from south of New York.

* **C. artitecta** Mack. (*C. nigromarginata* var. *muhlenbergii*). Dryish oak woods; rare. Riverside Junction, *S & E* 25017; north side of Salamanca, *S & E* 26521.

* **C. brevior** (Dewey) Mack. Open oak woods; rare. North side of Salamanca, *S & E* 26522. Rare and local throughout the State outside of the mountains.

C. bromoides Schk. Swales and wooded swamps; frequent. Tenmile Hollow, June 27, 1956 (St. B); observed at St. Bonaventure, South Vandalia, Mount Moriah, Riverside Junction, Carrollton and Horseshoe.

C. brunnescens (Pers.) Poir. Moist woods and boggy thickets; more common than indicated by House and Gordon. St. Bonaventure, *S* 24942; Carrollton, Peck, June; Salamanca Rock City, Alexander & House 13047; Quaker Bridge, Alexander & House 13017; Bear Bog, *S et al.* 22810; observed at South Vandalia Oxbow. All records are referable to var. *sphaerostachya* (Tuck.) Kük.

C. canescens L. Bogs and swamps in the River Valley; occasional. St. Bonaventure, *S* 24943; Mount Moriah Swamp, *E*, June 4, 1956

(St. B) ; South Vandalia Oxbow, *S & E* 26331. Reported from the bogs north of Steamburg and later as being common in Bear Bog, but the present investigator could find only the abundant *C. brunnescens* (of this series of species) in the latter station.

* *C. caroliniana* Schw. New to the State (Mackenzie, 1931-35; Hermann, 1954). Dry old field east of Red House, *S & F* 23183. This species with the stiff habit and fat perigynia of *C. bushii* Mack., for which the specimen was taken in the field, has smaller perigynia, less cuspidate pistillate scales and glabrous leaves. Taylor (House, 1924) cited a doubtful collection from Aqueduct (Long Island), but Mackenzie apparently did not accept it as he ranges this species north to New Jersey and Pennsylvania. Jennings reports this from Clarion County, Pa., on the south side of the High Plateau section; this would be the nearest station.

Carex cephaloidea Dewey (*C. sparganioides* var. *cephaloidea*). Low woods; another station for this sedge, which is apparently infrequent in the area. Horseshoe, *S & E* 26443.

C. debilis Mx. var. *rudgei* Bailey. Acid woods; frequent in the Conglomerate sections and somewhat so elsewhere. Additional stations are: Harrisburg, *S et al.*, July 26, 1956, (St. B) ; Coon Run, *anon.* (St. B 616, *p. p.*) ; observed at St. Bonaventure, Salamanca Rock City and north of Steamburg.

C. emoryi Dewey (*C. stricta* var. *elongata*). Sloughs; a second station. Muddy borders of Oxbow, Horseshoe, *S & E* 26439. The shores of the Allegheny River are the only stations in New York State, the first collection being from near Quaker Bridge. Jennings reports it from northeastern Ohio and from three counties in western Pennsylvania, none of them on his High Plateau.

C. gracilescens Steud. (*C. laxiflora*, *auct.*; *C. laxiflora* var. *gracilima*). Moist rich woods and seepage banks at edge of same; frequent near the Allegheny River. Three-quarters of a mile east of Vandalia, *E*, June 4, 1956 (St. B) ; South Vandalia Oxbow, *S & E* 26328; Riverside Junction, *S & E* 25022; Horseshoe, *S & E* 26434; north side of Salamanca, *S & E* 26519; opposite Red House, *S & E* 24982; north of Cold Spring, *S & E* 24957. Previously recorded only from Carrollton. This species is the most slender of the group closely allied to true *C. laxiflora*. It is further characterized by distinctly purple outer basal sheaths and more divaricate-arcuate paler perigynia. The plants have a distinctive appearance in the field.

C. granularis Muhl. Wet fields; apparently rare. Observed as disintegrating specimens at Killbuck, September 9, 1958, swaly field, one-half mile south of Conewango, *S et al.* 22653. Both stations are for var. *haleana* (Olney) Porter (*C. haleana*) previously reported only from a station near the Allegany School of Natural History. Both this and var. *granularis* are not infrequent in New York State outside the mountains, but there seems to be no general difference in occurrence.

* *C. grvida* Bailey var. *grvida*. New to the State. Alluvial flats, north of Quaker Bridge, *Alexander & House* 12203. This specimen was inadvertently misfiled with out-of-state specimens at the time of preparing the flora and the supplement. Dr. House discovered it shortly before he died and reaffirmed that all the specimens of *Carex* of that

effort had been identified by Mackenzie. It agrees fairly well with specimens from Illinois. House earlier had cited a possible mislabeled specimen from Sullivan Hill, Chemung County. This specimen, also identified by Mackenzie, seems to this writer to be referable to the related *C. aggregata* (*C. sparganioides* var. *aggregata*). The first record east of Ohio and lower Ontario.

C. grayii Carey (*C. asa-grayi*). Low woods of the river valley; not uncommon. Opposite St. Bonaventure, *S et al.*, July 26, 1956 (St. B); Carrollton, *S & F* 23436; Horseshoe, *S & E* 26442; river islands below Red House, *S et al.* 23619; observed at Quaker Bridge and mouth of State Line Run. Reported from Riverside Junction and the Balsam Swamp, Red House. The latter specimen could not be located and the habitat would be most unusual. Local in the larger valleys of the State.

C. hirtifolia Mack. Alluvial woods; possibly frequent, but fruiting and shattering early. South Vandalia Oxbow, *S & E* 26327; Riverside Junction, *S & E* 25016; Horseshoe, *S & E* 26437. House and Gordon give the habitat as "Dry fields, banks and open woodlands." The writer has never seen it in really dry sites.

* **C. intumescens** Rudge var. **fernaldii** Bailey (*C. intumescens*, p. p., of Gleason). Swampy woods; frequent. Carrollton, *S & F* 28049; near Murray Brook, Gordon (St. B 667); upper Red House Valley, Gordon, July 7, 1936; observed at Frecks. The material from Carrollton and that from the upper Red House Valley has the obovoid achenes with inflated perigynia and represents f. *ventriosa* Fern. A specimen from Quaker Run, Alexander, August 19, 1927, seems to be intermediate in achene-shape and perigynium-inflation between var. *intumescens* and var. *fernaldii* f. *fernaldii*. The var. *fernaldii* is probably commoner at higher elevations and in the colder swamps than is var. *intumescens*.

* **C. laevivaginata** (Kük.) Mack. Seepage areas in dry oak woods and swales; occasional. Riverside Junction, *S & E* 25028; meadow, south side of Conewango, *S et al.* 22655; Balsam Swamp, Red House, Alexander (St. B 571); Big Woods (Stoddard Hollow), Alexander, August 1926 (St. B); observed in alluvial woods at Carrollton. Probably overlooked for *Carex stipata* Muhl., under which name both the Alexander specimens rested. It is interesting to note that all the habitats apparently show moisture but seem to have little else in common.

C. laxiflora Lam. (*C. heterosperma*). Mixed or oak woodlands; frequent. Coon Rocks, northeast of Limestone, *E & Donahue*, July 28, 1956 (St. B); Tenmile Hollow, *E*, June 27, 1956 (St. B); Riverside Junction, *S et al.* 23122; *S & E* 25019; Killbuck, *S & E* 26488; observed at Horseshoe in alluvial woods.

C. leptalea Wahl. subsp. **leptalea** (Stone, 1911). Wooded swamps and swales; two more stations. Mount Moriah Swamp, *S & E* 26298; south side of Conewango, *S et al.* 22652. The latter station is remarkable for being in full sun, an unusual habitat for this part of the State.

* **C. muricata** L. var. **laricina** (Mack.) Gleason. (*C. cephalantha*, Fernald, 1950, p. p.; *C. laricina*). New to the State. Balsam Swamp, Red House Valley, Alexander & House 12620. This is the basis of the report of *C. angustior*. The relationship of these variants of *C. muricata* is very difficult to assess. This collection with perigynia smaller than in subsp. *cephalantha* (Bailey) Clausen (*C. cephalantha*—Clausen, 1949) and

more ovate with more strongly serrulate beaks than in *C. angustior* Mack. (*C. muricata* var. *angustata*) seems best referred here. The perigynia are lightly many nerved ventrally at base and the pistillate scales are blunter than in good subsp. *cephalantha*. The beaks, however, are about one-half the length of the bodies, which is long for var. *laricina*. This taxon, as a species, is cited (Mackenzie—1931-35) from the area about the upper Great Lakes, from Presque Isle, westward. Fernald (1950) reduces it outright to *C. cephalantha*.

C. pedunculata Muhl. Rich woods; frequent to common. East of Russell, *E et al.*, May 20, 1958 (St. B); observed at St. Bonaventure, South Vandalia Oxbow, Mount Moriah Swamp, the bogs north of Steamburg and Frecks. Reported from three other stations by Eaton. Overlooked because of early fruiting.

C. pensylvanica Lam. var. **pensylvanica**. Dry slopes and banks; additional stations. St. Bonaventure and vicinity; *E & Donahue* (St. B 686); *E et al.* (St. B 592, 593, 594); *S* 24995; Tributary 49, Allegheny River, *E* (St. B 591, p. p.); Killbuck, *S & E* 26493; observed at South Vandalia Oxbow, Horseshoe and Riverside Junction. Reported only from Red House Valley and downriver.

C. plantaginea Lam. Rich woods; several more stations. East of Russell, *E et al.*, May 20, 1958 (St. B); *S & E* 26263; north-facing slope, Town of Allegany, *E et al.*, April 22, 1958 (St. B); Tributary 49, Allegheny River, *E et al.* (St. B 629); 1 mile south of Peth, *E et al.* (St. B 630); observed southwest of Quaker Bridge and at Frecks. Listed as infrequent with only a single cited station at Quaker Run.

C. rosea Schk. Alluvial woods; two additional stations. Riverside Junction, *S & E* 25027; Horseshoe, *S & E* 26445. Considered uncommon and reported only from Limestone.

* **C. rostrata** Stokes. Alluvial soils in open marshes; scarce. Tunun-gwant Swamps, *S & F* 23163; *S et al.* 23532; Carrollton, *S & E* 26335.

* **C. seorsa** Howe. Wet woods; a single station. Mount Moriah Swamp, *E*, June 4, 1956 (St. B). Frequent only about Oneida Lake and locally in the region of New York City and Long Island; otherwise scattered (five stations) in upper New York.

Carex sparganioides Muhl. Dry oak woods; two more stations. Killbuck, *S & E* 26497; observed at Carrollton.

C. swanii (Fern.) Mack. Old fields and pastures; probably frequent. Eaton's Pond, Tenmile Valley, *E*, June 27, 1956 (St. B); south side of Conewango, *S et al.* 22651; observed one and one-half miles west of Allegany, in the vicinity of Red House Lake and near the Steamburg Bogs.

C. trichocarpa Muhl. Bottom lands, often in woods; frequent; new stations. Horseshoe, *S & E* 26440; Oldtown, *S et al.* 23508, 23796; south of State Line Run, *S & F* 23232. At Oldtown, it almost completely filled a large depression in a cultivated field of corn. Cited previously as occasional, it appears as a dominant species along many parts of the Allegheny River. Many places, it seems not to fruit well but is easily recognized by the purple-brown "necktie" of the upper sheaths.

C. trisperma Dewey. Thicketed bogs and wet woods; apparently rare: Bear Bog, *S et al.* 22811; Halls, *anon.* (St. B 574). These appear to be

var. *trisperma*, but var. *billingsii*, Knight, to which the previous records from Balsam Swamp and the Steamburg Bogs belong, seems to be primarily an attenuated form of sphagnum bogs.

* **C. typhina** Mx. Wet meadows; rare. Riverflats near Quaker Bridge, *Alexander & House* 12224. This specimen was apparently overlooked in the earlier reports. There are 17 stations scattered around the lower elevations of the State; 7 of these are on Long Island. Local in western Pennsylvania.

* **C. umbellata** Schk. (*C. abdita* Bickn.). Probably overlooked because of early maturing, small size and the characteristic of the fruit's being mostly hidden in the leafy sods. Dry fields and open thickets; scarce (?) Allegany, *S* 24996, 24997; Killbuck, *S & E* 26495, 26496. Reported from Camel Back, Olean. These collections are somewhat variable in all characters used to segregate *C. rugosperma* Mack. (*C. umbellata* auct.) The complex should be restudied.

* **C. vesicaria** L. Bottom lands; occasional to locally abundant. A prominent species in the swamps of the Tunungwant Creek near Limestone, *S & E* 23162; swales at Carrollton, *S & F* 23430, 23431; observed at Horseshoe. A specimen from the river islands below Red House, *S et al.* 23617, had sterile inflated perigynia and may be of hybrid origin.

* **Cyperus rivularis** Kunth. Wet meadows; rare. South side of Conewango, *S & Ketchledge* 25828. This should be found in similar habitats and on gravelbars along the Allegheny. Frequent, at low elevations, across the State.

Dulichium arundinaceum (L.) Britton. River shores, sloughs and bogs; probably frequent. Horseshoe, *S & E* 26429; observed on river islands below Red House. Previously reported from the Tunungwant Valley and the Steamburg Bogs, but not definitely reported from the borders of the Allegheny River, proper, although considered common by McVaugh (1938).

* **Eleocharis calva** Torr. Rivershores, bogs and wet meadows; probably frequent. South side of Conewango, *S et al.* 22649; observed about the Steamburg Bogs and on the margins of islands below Red House. Local according to McVaugh (1938).

* **E. tenuis** (Willd.) Schultes var. **borealis** (Svenson) Gleason (*E. elliptica*). Wet meadows; rare. South side of Conewango, *S et al.* 22650. Not listed by McVaugh (1938).

* **Eriophorum viridi-carinatum** (Engelm.) Fern. Swaly meadow; rare. South side of Conewango, *S et al.* 22647. The only previous record, Waterman Swamp, is outside the area studied and much more isolated from the Allegheny River than this. Its presence in the Conewango Valley suggests that it might be found to the south in the flats around Randolph and Steamburg. Locally frequent, as the next, across the State.

* **Scirpus lineatus** Mx. Open swaly fields; infrequent. South side of Conewango, *S et al.* 22648; observed just north of Randolph.

* **S. rubrotinctus** Fern. Swales; frequent. Limestone Creek, south edge of Limestone, *S & F* 23160; north side of Salamanca, *S & E* 26518; Quaker Run near mouth of Cain Hollow, *S & F* 23193. A specimen from the watergarden at the Allegany School of Natural History, Gordon, August 5, 1940, was considered by the collector as "probably

introduced," but it could have come in naturally. This taxon, which is proving not uncommon in upstate New York has uniformly small achenes, *ca.* 1.0 mm. In every other character cited by Fernald (1900) and by Beetle (1947) as separating this from *S. microcarpus* Presl, there is variation. This is probably a subspecies of *S. microcarpus*.

***Arisaema triphyllum* (L.) Schott subsp. *stewardsonii* (Britton) Huttleston (*A. stewardsonii*—Huttleston, 1949).** Alluvial woods and wooded swamps; frequent. Mount Moriah Swamp, *S & E* 26296; South Vandalia Oxbow, *S & E* 26326; Horseshoe, *S & E* 26426; Elko, *S et al.* 22623; observed at Riverside Junction, on the islands below Red House, at Oldtown and at the mouth of State Line Run. Previously reported only from the Steamburg Bogs. Subsp. *triphyllum* (*A. atrorubens*) is rare in alluvial woods, hereabouts, but is common in the drier woods above the bottoms. Probably more frequent than previously reported for upstate New York.

* ***Juncus acuminatus* Mx.** Ditches, oxbows, about bogs, etc.; frequent. Limestone, *S & F* 23155; Horseshoe, *S et al.* 27784; gravel pit near Red House, *S & F* 23179; Steamburg Bogs, *S et al.* 24389; Stillson's Pond, East Randolph, *Gordon* (St. B 937). Frequent at lower elevations, about the State.

***J. brevicaudatus* (Engelm.) Fern.** Swales; rare. Field, one-half mile south of Conewango, observed. Previously reported from a bog near Randolph. Rare in central and western New York.

* ***J. marginatus* Rostk.** Swales; rare. Field, one-half mile south of Conewango, *S et al.* 22646. Rare in western New York. Not cited as being near area on the south.

* ***J. tenuis* Willd. var. *dudleyi* (Wieg.) Hermann (*J. dudleyi*—Hermann, 1944).** Swales; rare. Field, one-half mile south of Conewango, *S et al.* 22644. This race apparently favors more alkaline soils than var. *tenuis*, which accounts for its rarity here. Frequent in the State, mostly at lower elevations.

***Allium canadense* L. var. *canadense* (Ownbey & Aase, 1955).** Low fields and woods; common in the Tunungwant Valley and along the Allegheny River above and below the mouth of the Tunungwant. Limestone, *Alexander & House* 12700; St. Bonaventure, *E et al.*, April 15, 1958 (St. B); Horseshoe, *S & E* 26418. Previously cited only from Riverside Junction. Frequent at low elevations in the State.

***Clintonia umbellulata* (Mx.) Morong.** Rich woods; more frequent than the three cited stations would indicate. Sixteen stations are known in the area covered. Known only from Letchworth Park, Livingston and Wyoming Counties, south and west in the State. An Alleghenian species.

***Erythronium americanum* Ker.** Rich woods and low thickets; frequent, as indicated, at least in the main valley. Allegany, *anon.* (St. B 746); St. Bonaventure, *E et al.* (St. B 744); east of Russell, *E et al.*, May 20, 1958 (St. B); Horseshoe, *S & E* 26421; one mile southwest of Peth, *E* (St. B 745); Jack Point, Onoville, *Fenton* 452; observed at Riverside Junction. These substantiate the earlier estimate of frequency without cited stations. Common in the State, except for central Long Island.

Lilium canadense L. subsp. **canadense**. Low grounds; apparently rare. Populations of the common race (in New York State) were never seen in the area by the writer, although a colony was found in wet woods at Cherry Creek, Chautauqua County, in the Conewango Valley. The only old specimen found was from Quaker Bridge, *Alexander & House* 12550, but that had flowers that at least approached those of the next, being dusky red and with weakly recurved tepals. The leaves were too narrow for that taxon, however. A specimen from north of Quaker Bridge, in a mixed population, *S & F* 28052, was depauperate, but apparently this, on purely morphological grounds.

* **L. canadense** L. subsp. **editorum** (Fern.) Wherry (*L. canadense*, p. p. of Gleason, 1952—Wherry, 1947). Seepage areas on banks bordering oak woods and in meadows below such areas; occasional. Just west of Vandalia, *S & F* 20753; *E*, July 27, 1956 (St. B); opposite Red House, *S & F* 23073. This is the north edge of the range and the plants are variable. They are referred here on the basis of the narrow dark garnet-red tepals, which are comparatively weakly flaring, giving the effect of a long tubular base to the flowers. The leaves vary from those typical of this subspecies to those far too narrow and attenuate. The Vandalia colony is the most typical and the most uniform. A collection from north of Quaker Bridge was relatively small-leaved. Two plants (*S & F* 23197) had the leaves about one-quarter as long as broad and blunt. The third (*S & F* 28052) had them one-sixth to one-ninth as long as broad and attenuate; the tepals were broader, much lighter, with more yellow pigmentation and more markedly flaring at tip. This third specimen is cited under the typical subspecies. Jennings lists only subsp. *editorum* for western Pennsylvania.

* **Polygonatum biflorum** (Walt.) Ell. Open oak woods; rare. Riverside Junction, *S & F* 24504; Killbuck, *S & E* 26486. In many parts of the State, particularly near the larger valleys, this species seems less common than the next.

P. commutatum (R. & S.) Dietr. (*P. canaliculatum* auct., incl. *P. giganteum*—R. P. Ownbey, 1944). Alluvial thickets; infrequent. Observed above Quaker Bridge, south of Quaker Bridge and at Oldtown. Reported only from near Cold Spring. The author thinks this should be treated as a subspecies (cytotype) of *P. biflorum*.

* **Uvularia perfoliata** L. Acid woods and thickets and old fields; frequent. 1 mile west of Harrisburg, *E et al.* (St. B 721); Riverside Junction, *S & F* 23117; *S & E* 25031; Killbuck, *S & E* 26485; north of Red House, *Fenton* 308; north of Cold Spring, *S & F* 23791; Cold Spring, *Fenton* 23; observed opposite Red House and southwest of Quaker Bridge. This was originally reported as common in the region but was later considered to be absent, on the basis of available specimens which proved to be *U. grandiflora*. *U. perfoliata* has the wider range in the State.

* **Hypoxis hirsuta** (L.) Coville. Probably open oak woods or fields nearby; rare. Allegany, *anon.* (St. B 826). No data as to habitat is on the label. It is not surprising to find it here in view of its occurrence in the Chemung Valley. Jennings cites it as common, except in his High Plateau.

Goodyera repens (L.) R. Br. var. **ophioides** Fern. Cold woods; rare. Mount Oneida, *Saunders* (St. B 879) (as *Epipactis tessellata*). Reported from Salamanca by Day, but no supporting specimen found (House and Gordon, 1940).

Habenaria clavellata (Mx.) Spreng. Bogs; scarce. Mount Moriah Swamp, *E et al.* (St. B 3069); observed at Bear Bog. Reported only from the vicinity of the Steamburg Bogs. Frequent in the State.

H. flava (L.) R. Br. var. **herbiola** (R. Br.) Ames & Correll (var. *virescens*). Swampy meadows; rare. Large colony in the Tunungwant Valley, near Limestone, *S & F* 23165; *S et al.* 23535. The plants varied greatly in size and most of them seemed to have two or three large leaves abruptly succeeded by much smaller bracteal leaves; the petal-shape, however, agreed with var. *herbiola*, as figured by Correll (1951). The specimen from Rush Run, the only earlier collection, has the leaves more gradually reduced as required by Fernald (1950) for var. *herbiola*. From the specimens in the State herbarium, there is too much variation in this characteristic for it to be useful. Local in the State.

* **H. hyperborea** (L.) R. Br. var. **huronensis** (Nutt.) Farw. (*H. hyperborea auct.*, p. p.). Meadows bordering bogs; rare. North of Steamburg, *S et al.* 24390. This is at the southern border of the range of the species.

H. lacera (Mx.) Lodd. Moist places; rare. Meadow bordering bog, north of Steamburg, *S et al.* 23228. Previously reported only from Mount Moriah Swamp and Seneca Mountain. Frequent in the State.

Liparis loeselii (L.) L. C. Richard. Boggy woods and swaly meadows; rare. South side of Conewango, *S & Ketchledge* 25830. Reported from the Balsam Swamp at Red House. Locally frequent statewide, except in the mountains.

Spiranthes cernua (L.) L. C. Richard. Swaly meadows and ditches; scarce. South side of Conewango, *S & Ketchledge* 25829; observed at mouth of Tenmile Creek. Reported from St. Bonaventure, Blacksnake Mountain and from the Town of Carrollton; the latter specimens are from Weaver Draw, Tenmile Valley. Common in the State.

* **Populus deltoides** Marsh. Streambottoms; possibly frequent. Islands below Red House, *S et al.* 23604; observed at Peth. New to Cattaraugus County; also collected, outside the immediate area, on the south edge of Otto, *S et al.* 23727. Common along the larger streams of the State.

Salix interior Rowlee. Gravelbars; local. Islands below Red House, *S et al.* 23605; Oldtown, *S et al.* 24475. Previously reported only from Onoville. Not uncommon on bars at the lower elevations in central and western New York; local eastward.

Comptonia peregrina (L.) Coult. var. **peregrina** (*Myrica asplenifolia auct.*, p. p.; *M. asplenifolia* var. *tomentosa*). Dry fields; locally common as stated. Additional stations are: Allegany, *anon.* (St. B 1004); Red House, *Fenton* 170; observed east of Vandalia. Not uncommon in many parts of the State on sterile soils; var. *asplenifolia* (L.) Fern. only on Long Island.

Carya cordiformis (Wang.) K. Koch. Woods; not uncommon along the river and occasional in uplands nearby. Horseshoe, *S et al.* 27750; river islands below Red House, *S et al.* 23600; Pierce's Run, *Fenton*

459; observed east of Russell and at Killbuck. Frequent statewide, outside of the mountains.

Carya glabra (Mill.) Sweet. Open oak woods; occasional. Killbuck, *S et al.* 27713; observed at Riverside Junction. Reported only from Quaker Bridge and from moist woods. About the same range as the last.

Carpinus caroliniana Walt. var. **virginiana** (Marsh.) Fern. (*C. caroliniana*, p. p., Gleason, 1952). Woods and thickets; not as infrequent as indicated. Observed at the following stations: Limestone, east of Vandalia, Horseshoe, north of Steamburg, Elko, Frecks. Common in the State.

Corylus cornuta Marsh. Woods and thickets; a few more stations on the east side of the area. St. Bonaventure, *E et al.* (St. B 1027, 1028); Allegany, *anon.* (St. B 1029); observed at Riverside Junction. Frequent in the State, except for the Coastal Plain, where rare.

Quercus prinoides Willd. Dry thickets; rare. Near Red House, Knobloch 503. Previously reported from terrace north of Onoville. Both specimens consist of leafy shoots with very young fruits. They have the leafhairs and the leafmargins of this species as prescribed by Dyal (1936). These are the only stations in western New York; local in western Pennsylvania.

Ulmus rubra Muhl. (*U. fulva*). Low woods; possibly frequent, but not as gregarious as *U. americana* L. (a situation prevailing over most of the lowlands of New York). St. Bonaventure, *E et al.* (St. B 1141, 1142, 1211); Horseshoe, *S & E* 26402; observed at Riverside Junction. Previously reported only from Quaker Bridge. *U. rubra* seems to be absent from higher elevations in this State, where *U. americana* can be found (except for the highest).

Comandra umbellata (L.) Nutt. Dry woods and thickets; more common than indicated. Allegany, *anon.* (St. B 1154); Vandalia, *E* (St. B 1214); Killbuck, *S & E* 26471; Quaker Bridge, *Alexander & House* 12545. Frequent at lower elevations in the State.

Asarum canadense L. var. **reflexum** (Bickn.) Robinson (*A. reflexum*). Bottom land woods; rare. South Vandalia Oxbow, *S & E* 27996; Horseshoe, *S & E* 26363. Previously reported only from Quaker Run. Very local in the State: vicinity of New York City; drainage of Seneca River; western New York. This investigator can see little distinctive in New York material of var. *acuminatum* (Ashe) Bickn., so labeled, other than the more caudate tips of the calyx-lobes. Var. *reflexum*, on the other hand, has a number of characteristics. The rhizomes are slender; the leaves average smaller; the flowers are smaller, with prominently reflexed lobes. In the field, at flowering time, the leaves appear a brighter yellow-green, the young ones not grayish; the flowers are a brighter "brick-red," with more yellow in the pigmentation and the area of white inside the calyx is greater. In the areas where the var. *reflexum* has been seen in New York State, the var. *canadense* (incl. var. *acuminatum*) could not be found closely associated but was frequently in upland areas nearby.

Polygonum arifolium L. var. **pubescens** (Keller) Fern. (*P. arifolium* auct.). Bogs; rare. A new station east of the others: Mount Moriah Swamp, *S & E* 26291. Frequent in the lowlands of the State, south of the Adirondacks.

P. cilinode Mx. Bottom lands; common. Horseshoe, *S & E* 26408; mouth of State Line Run, *S & F* 23231; observed at Carrollton, Riverside Junction, islands below Red House and Oldtown. Dry habitats are usually emphasized for this species. It should be noted that the colonies on these bottoms are frequently extensive and luxuriant. Locally frequent in the counties bordering Pennsylvania.

P. hydropiperoides Mx. subsp. **hydropiperoides** (Stone, 1911). Sloughs; a new station. Horseshoe, *S & E* 27768. Considered common by McVaugh (1938).

P. scandens L. Bottom lands; four more stations. Horseshoe, *S et al.* 27767; observed at lower Quaker Run. Oldtown and mouth of State Line Run.

* **Rumex altissimus** Wood. Alluvial woods; rare. Islands below Red House, *S et al.* 23609. "Rosettes" observed at Horseshoe, May 28, 1958, were probably this. Specimens collected in similar habitats in the Susquehanna drainage east of the area lead the investigator to suspect that it may be native in such areas. Jennings does not list it for the High Plateau.

Claytonia virginica L. Frequent on bottom lands, at least above Salamanca. Allegany, *anon.* (St. B 1226); St. Bonaventure, *E & Yackovich* (St. B 1222); Horseshoe, *S & E* 26406; observed at South Vandalia Oxbow. Reported previously only from Wolf Run. This species is more restricted in range in this State, being found primarily in more alluvial situations, in the experience of the author, than *C. caroliniana* Mx.

Arenaria lateriflora L. Low woods and grassy fields; infrequent. New stations upriver. South Vandalia Oxbow, *S & E* 26318; lower Tenmile Creek, *S & E* 24936; Horseshoe, *S & E* 26405. The grassy field habitat is one to add to those mentioned by House and Gordon.

* **Cerastium nutans** Raf. Springy grassy banks; rare. North of Cold Spring, *S & E* 24955, where luxuriant. Jennings thinks it weedy and considers it rare in northwestern Pennsylvania. Zenkert reports this only from the escarpment east of Buffalo. Rare in south-central New York.

Paronychia canadensis (L.) Wood (*Anychia canadensis*). Dry oak woods; apparently rare, but possibly overlooked. Killbuck, *S & E* 26483; *S et al.* 27727. Previously reported from just west of Bradford (Riverside) Junction. The only other report for the State west of the Finger Lakes is at Scottsville, Monroe County. Jennings points out its rarity in the northern part of his area.

Silene antirrhina L. Native in the region (?). Dry oak woods; scarce. Killbuck, observed. Previously reported as an infrequent weed along railroads. Again, apparently rare to the south of area.

S. stellata (L.) Ait. f. Open woods; additional stations upriver. St. Bonaventure, *E et al.* (St. B 1248, 1249); one-half mile west of Bradford (Riverside) Junction, *Gordon* (St. B 1251); observed at Killbuck. Infrequent across the State, south of the mountains.

Stellaria longifolia Muhl. Moist places; not infrequent near the river. Mount Moriah Swamp, *S & E* 26289; Horseshoe, *S & E* 26404; opposite Red House, *S & E* 24979; south side of Conewango, *S et al.* 22642; observed at Riverside Junction and lower Tenmile Creek. Previously reported only from Quaker Run.

Nuphar luteum (L.) Sibth. & Sm. subsp. **macrophyllum** (Small) Beal (*Nymphaea advena*; *Nuphar advena*—Beal, 1956). Occasional in the larger valleys. Observed at Limestone and Horseshoe. Reported from Riverside Junction. Not listed by McVaugh (1938).

* **N. luteum** (L.) Sibth. & Sm. subsp. **variegatum** (Engelm.) Beal (*N. variegatum*—Beal, 1956). Lakes and ponds; occasional. Lakeshore, Allegany State Park, *Yackovich et al.* (St. B 1261); observed in Red Pond. Considered common by McVaugh (1938). Subsp. *macrophyllum* is more southern in distribution than subsp. *variegatum*.

Anemonella thalioides (L.) Spach. Open oak woods; rare. Allegany, *anon.* (St. B. 1283); St. Bonaventure, *E et al.* (St. B 1282, 1284, 1285). Reported only from the vicinity of Red House.

Caltha palustris L. Scarce. A new station. Mount Moriah Swamp, *S & E* 26277.

Hepatica americana (DC) Ker. Open oak woods; not infrequent. One and one-half miles north of St. Bonaventure, *E & Donahue* (St. B 1286); Killbuck, *S & E* 26460; observed east of Vandalia and at Riverside Junction.

* **Ranunculus abortivus** L. var. **acrolasius** Fern. Open woods and seepage banks; at least occasional. St. Bonaventure, *E & Ellis* (St. B 3088); Horseshoe, *S & E* 26360; vicinity of Cold Spring, *S & E* 24952. Benson (1948) considered this variety interesting because of apparently distinctive range but unworthy of nomenclatorial rank because based on only one character; he recognized var. *eucyclus* because it was based on two characters. Fassett (1942), in using mass collections, considered var. *eucyclus* trivial but recognized var. *acrolasius* as a geographic race. The pubescence is sparse and may disappear in age; transplant-studies might solve the problem. Var. *acrolasius* is reported from western New York.

R. ambigens S. Wats. (*R. laxicaulis* auct.). Bottom lands; rare. Cold Spring, *Alexander*, August 16, 1927. Reported from the Tungungwant Valley and from Salamanca; also from Portville to the east (McVaugh, 1938).

* **R. hispidus** Mx. var. **hispidus**. Swampy woods and bottom lands; rare. South Vandalia Oxbow, *S & E* 26313; Riverside Junction, *S & F* 25003; observed at Horseshoe. The collected specimens, at least, have small flowers, much-dissected leaves and are rather tall; they resemble a photograph of *R. hirtipes* Greene in the files of the New York State Museum. Benson (1948) refers *R. hirtipes* to the present taxon.

R. hispidus Mx. var. **falsus** Fern. (*R. hispidus* auct., p. p.—Benson, 1948, 1954). Dryish open woods and nearby banks; frequent. St. Bonaventure, *E et al.* (St. B 1269); Riverside Junction, *S & E* 25004; Killbuck, *S & E* 26458, 26459; opposite Red House, *S & E* 24965; observed at Vandalia and east. Previously reported only from near Quaker Bridge. The range of the variants of *R. hispidus* in this State is difficult to state at this time, due to confusion in older records.

R. septentrionalis Poir. var. **septentrionalis**. Sloughs and stream-margins; common in the bottom lands. Mount Moriah Swamp, *S & E* 26278; Horseshoe, *S & E* 26356, 26358; observed at many sites. Considered infrequent by House and Alexander.

Lindera benzoin (L.) Blume var. **benzoin** (*Benzoin aestivale*). Low woods; two more stations. Observed in Mount Moriah Swamp and at South Vandalia Oxbow. This species is found in the lowlands throughout much of upstate New York but frequently dies to the ground after severe winters.

Sanguinaria canadensis L. var. **canadensis**. Low woods; probably frequent near the river. Horseshoe, *S & E* 26364; south of Quaker Bridge, *S et al.* 22690; observed on the islands below Red House. Previously reported from Onoville (Fenton, 1949) and Red House.

* **Arabis canadensis** L. Open oak woods; rare (?). Killbuck, *S et al.* 27708. Infrequent in western New York.

Cardamine bulbosa (Schreb.) BSP. Alluvial woods; rare. Riverside Junction, *S & E* 25007; Horseshoe, *S & E* 26366. Numerous individuals were present in each colony.

C. douglassii (Torr.) Britton. Springy thickets; rare. Observed along Tenmile Creek in great abundance. Previously reported only from Red House Valley. This and the preceding need to be restudied throughout their ranges in this State.

C. rotundifolia Mx. Springy woods and banks; a new station. Seepage bank opposite Red House, *S & E* 24966. In New York State, restricted to the southwestern corner.

* **Erysimum cheiranthoides** L. Occasional. River gravels near Quaker Bridge, *Saunders*, July 31, 1940. Generally distributed about the State except for Long Island; frequently weedy.

* **Agrimonia pubescens** Wallr. Thickets in oak barrens; rare. South of Quaker Bridge, *S & F* 23246. The distribution of the Agrimonies in this State is imperfectly known.

Geum laciniatum Murr. (*G. virginianum auct.*). Moist meadows and thickets; more frequent than indicated. Observed in several places from Limestone to Killbuck. Common throughout most of New York State, at least in the lowlands.

Pyrus floribunda Lindl. (*Aronia arbutifolia auct.*, *p. p.*; *A. prunifolia*). Bogs; scarce. Allegany, *anon.* (St. B 1500); *E et al.* (St. B 1498); observed in bogs, north of Steamburg. Such specimens as had flowers or fruits had nonglandular calyx-lobes; all are sparsely hairy. Gordon's specimens from Owlensburg Bog and some from the "Rock Cities" to the east also belong here.

Rosa palustris Marsh. Marshes; scarce. Allegany, *anon.* (St. B 1589). Previously reported only from Limestone. Not uncommon in many parts of the State in swales and marshes.

* **Rubus canadensis** L. Old fields and river thickets; probably overlooked. Cold Spring, *Fenton* 55; Quaker Bridge, *S & F* 23483. Not uncommon upstate, but mostly at higher elevations than *R. allegheniensis*.

R. occidentalis L. Old fields, waste places and thickets; frequent. Several observations were made from Allegany to Elko. Frequent in the State outside of the mountains.

* **R. × permixtus** Blanch. (*allegheniensis* × *hispidus*). Boggy woods; rare. St. Bonaventure, *S & E* 24939, Fernald (1950) considers this a species; Gleason (1952) includes it in his collective *R. hispidus* L. It is local wherever the two alleged parents are found.

Spiraea alba du Roi. Riverbottom swales, etc.; occasional. St. Bonaventure, *anon.* (St. B 1483); *E et al.* (St. B 1481); west of Vandalia, *S & F* 23710; Horseshoe, *S et al.* 26393; observed at East Randolph. This is a frequent shrub in central and western New York.

* **Baptisia tinctoria** (L.) R. Br. var. **projecta** Fern. New to the State. Dry banks; rare. North of Quaker Bridge, *S et al.* 22596, 22722. These plants had flowering racemes up to 40 cm. long and large flowers for the species. They were collected June 18-19 in a large colony of nonflowering individuals. These latter flowered two to three weeks later and were normal var. *tinctoria* (incl. var. *crebra* Fern.—Clausen, 1944). Known north to central Pennsylvania.

Desmodium cuspidatum (Muhl.) Loud. (*D. bracteosum*). Steep rocky oak woods; a new station. Killbuck, *S et al.* 27724.

D. nudiflorum (L.) DC. Open oak woods; scarce. Three more stations: Killbuck, *S et al.* 27725; southwest of Quaker Bridge, *S & F* 24497; observed east of Vandalia.

D. rotundifolium DC. Open oak woods; infrequent. Two more stations. Riverside Junction, *S et al.* 23112; observed southwest of Quaker Bridge. The specimens of all the species of *Desmodium* should be restudied and much more collecting must be done before adequate statements of range can be made.

Lathyrus ochroleucus Hook. Dry woods and banks nearby; probably frequent. One-half mile east of Vandalia, *E* (St. B 3115); Riverside Junction, *S & E* 25013; observed at Vandalia and Killbuck. Previously reported from Carrollton and Butler Run. The abundance of this species increases westward in the State.

Lespedeza capitata Mx. Dry fields; frequent. St. Bonaventure, *E et al.* (St. B 1688); Horseshoe, *S et al.* 26397, 27762; Cold Spring, *Alexander & House* 12796; south of Quaker Bridge, *S et al.* 24468. Previously reported only from Elko.

L. intermedia (S. Wats.) Britton. Open oak woods and thickets; infrequent. Two new stations: Killbuck, *S et al.* 27726; Red Pond, *S et al.* 23766. The total range of the species of *Lespedeza*, like that of the species of *Desmodium*, covers the State south of the Adirondacks and outside of the Catskills. They become increasingly scarce at the higher elevations.

Lupinus perennis L. subsp. **perennis** (Phillips—1955). Oak woods and sandy barrens; rare. A single large clump, east of Riverside Junction (a new station), *S & E* 26338. This species has much the same general range as that of the two genera just mentioned.

Polygala senega L. Edge of oak woods; rare. Opposite Red House, *S & E* 24969. Reported from Quaker Bridge. Rather rare in western New York.

Acalypha rhomboidea Raf. (*A. virginica* auct.). Dry soil; infrequent, as stated. West of Red House, *S et al.* 24417; observed at Killbuck and Quaker Bridge. House considers it frequent or common across the State.

* **Callitriche palustris** L. Moist soil about water; probably overlooked. On mud of emptied pond, East Randolph, *S et al.* 24453. Not listed by McVaugh (1938).

Floerkea proserpinacoides Willd. Alluvial woods and seepage banks; probably frequent in the river valley. Riverside Junction, *S & E* 25011; Horseshoe, *S & E* 26379; north of Cold Spring, *S & E* 24954. Previously reported only from Red House. The author considers this to be one of the most commonly overlooked species. It is not uncommon in central New York. Zenkert considers it infrequent in western New York and Jennings thinks that it is relatively absent from the northern part of the High Plateau.

Rhus typhina Torner (Barkley, 1937). Dry thickets; frequent. Observed from Allegany to Elko; definitely cited only from Quaker Bridge. Considered common throughout the State except for Long Island.

R. glabra L. Dry thickets; locally frequent. Observed at several places from Red House to Elko. Frequent or common throughout most of the State.

R. vernix L. Bogs; rare. Balsam Swamp, Red House, *Riccardo* (St. B 1742); *Vecchierello* (St. B 1741). Also reported from Mount Moriah Swamp and the bogs about Steamburg and Randolph. Locally common throughout the State except for the higher Adirondacks.

Acer nigrum Mx. f. var. **nigrum** (Fosberg, 1954). Low woods; not infrequent. Vandalia, *E* (St. B 1786); Tunungwant Valley, *Alexander* (St. B. 1782); Horseshoe, *S & E* 26381; Killbuck, *S & E* 26472; *S et al.* 27712; Oldtown, *S et al.* 23794; observed at Riverside Junction. Reported from "Allegany State Park," without further designation of localities. The problem of subspecies has been discussed by Desmerais (1952), but this investigator agrees with Fosberg (1954) and Clausen (1949) on the choice of specific name.

Rhamnus alnifolia l'Her. Wooded swamps; rare. Mount Moriah Swamp, *E* (St. B 1749). Previously reported only from Red House. Infrequent in western New York.

Hypericum pyramidatum Ait. (*H. ascyron*). Riverbanks; rare. Horseshoe, *S & E* 26375. Previously reported from Elko and a swamp near Randolph. Rare to infrequent throughout the lowlands of upstate New York.

* **H. canadense** L. Cultivated fields; rare. Vicinity of Red Pond, *S et al.* 23756. This species is common only in the Adirondacks and on Long Island; it is scarce to rare elsewhere in the State. The only other record from western New York is an unconfirmed one for Niagara Falls. Jennings considers it rare; his closest station would be Presque Isle, Pa.

* **H. virginicum** L. var. **fraseri** (Spach) Fern. (*Triadenum fraseri*) Swamps and bogs; scarce. Tunungwant Valley, *anon.* (St. B 1854). Reported from the bogs about Steamburg as *H. virginicum*. The specimens from Allenberg (Owlenburg) Bog are all var. *virginicum*. Jennings (1953) allows both varieties to cover the area but with different frequencies. Gleason (1952) thinks them worthy of specific rank.

* **Viola affinis** Le Conte. Old fields; rare. Pasture at edge of Mount Moriah Swamp, *S & E* 26281. Frequent in western New York; possibly overlooked in western Pennsylvania.

V. fimbriatula Sm. Old fields; rare. Pasture at edge of Mount Moriah Swamp, *S & E* 26282. Reported from the vicinity of Vandalia. Rather rare in western New York.

* **V. sagittata** Ait. Old fields; rare. Vicinity of bogs, north of Steamburg, *S & F* 23754; *S & Schumacher* 24386, 24387. Frequent in the middle Hudson Valley and on parts of Long Island; rare elsewhere in the State. Rare or infrequent on the High Plateau to the south.

V. sororia Willd. Alluvial bottom lands; frequent as elsewhere in the State in such habitats. South Vandalia Oxbow, *S & E* 26314; Horseshoe, *S et al.* 26369, 27746; Elko, *S et al.* 22691, 22747; observed at Carrollton and Quaker Bridge, on the islands below Red House and at Oldtown. Reported as infrequent.

V. striata Ait. Bottom land woods; scarce. Across the river from St. Bonaventure, *Donahue & E* (St. B 3135); Horseshoe, *S & E* 26367. Reported only from Quaker Run. Common in western Pennsylvania; infrequent in the Niagara Frontier.

Angelica atropurpurea L. var. **atropurpurea** (*A. atropurpurea*, p. p., of Gleason, 1952). Bottom lands; frequent along the river. Observed at South Vandalia Oxbow, Riverside Junction, Horseshoe, Quaker Bridge and Oldtown. Previously reported as rare, the only cited stations being Cold Spring and Randolph. Relatively common throughout most of New York.

Heracleum lanatum Mx. (*H. maximum*). Bottom lands; frequent along the river. Observed at Vandalia, South Vandalia, Horseshoe and Quaker Bridge. Definitely cited only from Cold Spring. Frequent across the State.

Osmorrhiza longistylis (Torr.) D. C. Woods and thickets; apparently rare. Allegany, *anon.* (St. B 2041). Reported from Quaker Bridge. Not as common as *O. claytonii* (Mx.) Clarke in this State.

Cornus alba L. subsp. **stolonifera** (Mx.) Wangerin (*C. stolonifera*—Clausen, 1949). Riverbottom thickets; rare. One-half mile west of Allegany, *E*, Sept. 23, 1956 (St. B); Quaker Bridge, *Fenton* 448. Generally common, upstate. Jennings suggests that it is not native except in the glaciated area. Previously reported from the driftbogs around Randolph.

* **C. drummondii** C. A. Meyer. Bottom land thickets; rare. Cold Spring, *Fenton* 11. The only other record for New York State is on the Cattaraugus Indian Reservation near Gowanda, Erie County, whence it was reported as *C. asperifolia*. This may have been brought in by the Iroquois, who used it in medicine.

Monotropa hypopithys L. subsp. **lanuginosa** (Mx.) Breitung (*M. hypopithys* and *M. hypopithys auct. amer.*—Breitung, 1957). Acid woods; infrequent. Tenmile Hollow, *E* (St. B 3198, 3199); Riverside Junction, *S et al.* 23110; observed east of Vandalia and at Killbuck. Reported as infrequent; these new stations are all on the northwest corner of the range.

Vaccinium corymbosum L. Wet woods; scarce. St. Bonaventure, *E et al.* (St. B 2167); Mount Moriah Swamp, *S & E* 26283. Previously reported only from the Steamburg Bogs.

V. stamineum L. Dry open woods and old fields; infrequent. St. Bonaventure, *E et al.* 2158, 2180; Allegany, *anon.* (St. B 2183); one and one-half miles from St. Bonaventure, *E & Donahue* (St. B 2187); Killbuck, *S & E* 26470. Earlier stations were all from the west side of the Park.

* **Fraxinus pennsylvanica** Marsh. subsp. **pennsylvanica** (Miller, 1955). Bottom land woods; probably frequent. Carrollton, *S & F* 23385; Horseshoe, *S & E* 26372; west of Red House, *S & F* 23778; islands below Red House, *S et al.* 23590. The specimen from Horseshoe was downy; all others were nearly glabrous. The glabrate variant was also observed at Horseshoe. The trees from west of Red House had abundant fruit; none of the others had either flowers or fruit. All showed the distinctive epidermal pattern on the dorsal leaflet-surfaces. Frequent in western New York.

Bartonia virginica (L.) BSP. Acid soil; rare. Gravelly terrace, oak barrens, north of Onoville, *Saunders* (St. B 2215). Previously reported only from the Steamburg Bogs. Infrequent in western New York.

* **Apocynum cannabinum** L. Gravelbars and poor soil; infrequent. St. Bonaventure, *E et al.* (St. B 2232); islands below Red House, *S et al.* 23591.

* **A. × medium** Greene (*androsaemifolium* × *cannabinum* or *sibiricum*). Poor soil; occasional. Allegany, *anon.* (St. B 2227, 2234); Carrollton, *S & F* 23389.

* **A. sibiricum** Jacq. var. **sibiricum**. Poor soil; frequent. St. Bonaventure, *anon.* (St. B 2230); near Holts Run, *Daniels et al.* (St. B 2228); near Elko, *Hicks* (St. B 2229); Elko, *S et al.* 22755; observed at Oldtown. The Hicks and Daniels specimens were both labeled *A. cannabinum* and apparently were the vouchers for that species in the original report. Details of distribution of these Indian hemps in western New York await more and better collections.

Asclepias quadrifolia Jacq. Open oak woods; rare. Killbuck, *S & E* 26469; *S et al.* 27711. The only earlier report is an old one from Salamanca. Rare in western New York; frequent in western Pennsylvania but less common on the High Plateau.

Convolvulus spithameus L. Dry gravelly soil; local. Killbuck, *S & E* 26484. Reported only from the vicinity of Red House. Rare in western New York; not reported from the northern High Plateau in western Pennsylvania.

Phlox maculata L. subsp. **maculata** (Wherry, 1951). Roadside ditches and swales; local. St. Bonaventure, *Vecchierello*, May 15, 1924; opposite Red House, *S & F*, 23072; Red House Valley, *Porter* (St. B 2340). Reported only from Quaker Bridge and vicinity. These stations are on the north edge of the native range. Rare in New York State; common to the south.

Polemonium reptans L. Springy woods, thickets, banks; frequent in the larger valleys. Additional stations are: St. Bonaventure, *E et al.* (St. B 2332); Allegany, *anon.* (St. B 2331); observed at South Vandalia Oxbow, Carrollton, Horseshoe, west of Red House and north of Elko. Common in the lower Chemung Valley, the Genesee Valley and the Allegheny drainage in New York State.

Agastache scrophulariifolia (Willd.) Ktze. Edge of bottom land woods and thickets; rare. Horseshoe, *S et al.* 27781; Oldtown, *S et al.* 23501. Infrequent or rare throughout most of the State. Widely scattered and infrequent in western Pennsylvania.

Lycopus virginicus L. Moist places, in shade or open; rare—a second station. St. Bonaventure, *E et al.* (St. B 2298). Reported from

Red House Creek. Infrequent in western New York.

Monarda clinopodia L. Low woods and thickets, moist or dry; infrequent. West of Red House, *S et al.* 24398; south of Quaker Bridge, *S & F* 23243; Oldtown, *S et al.* 23503; observed at Killbuck. Reported from Carrollton, Cold Spring and Quaker Bridge. In New York State known only from Tioga, Tompkins and Monroe Counties westward.

* ***Pycnanthemum incanum*** (L.) Mx. Steep slopes in oak woods; rare. Killbuck, *S et al.* 27730. Not infrequent south of Lake Ontario and the Mohawk River except for the Catskills and extreme western New York; infrequent on the High Plateau just south.

Teucrium canadense L. (incl. varieties and *T. occidentale*—McClintock & Epling, 1946). Habitat as cited; scarce. New stations are: Horseshoe, *S et al.* 27780; islands below Red House, *S et al.* 23611; near Onoville, *Gordon* (St. B 2241). Frequent in western New York.

* ***Chelone glabra*** L. subsp. ***elatior*** (Raf.) Pennell. New to the State; bottom land woods; rare. Horseshoe, *S et al.* 27779. This record is based on two plants growing in a colony of normal subsp. *glabra*. They were several inches taller, with corollas entirely rose, externally; the leaves were thinner with longer petioles and were more incised-serrate. They were a good match for Jennings' plate of subsp. *elatior* (1953). According to Pennell's maps and cited specimens (1935), this is new to New York State, but Fernald (1950) extends the range to New Hampshire, including his own f. *rosea*. Pennell does not cite this latter name in synonymy or the index but refers the type (indicated by footnote) to subsp. *glabra*. Fernald emphasizes the thinness of the leaves. Gleason (1952) points out the overlapping of range of all other races with the nominal race. Here, at least, there were no intermediates. The isolating mechanism was not apparent.

Lindernia dubia (L.) Pennell (*Ilysanthes dubia*). Gravelbars and muddy borders of pools; scarce. Horseshoe, *S et al.* 27777, 27778; river islands below Red House, *S et al.* 23610; observed at East Randolph. Reported from Fivemile Creek and from near Cold Spring. Rare in western New York; frequent in western Pennsylvania. The plants from the mudsites had larger, thinner leaves with more rounded bases and more prominently toothed margins; they showed no tendency to reduction of upper leaves. The plants from the gravelbars had thicker leaves with somewhat narrowed bases and these were nearly entire; the older plants showed signs of reduction of the upper leaves. All the specimens had pedicels varying from 5-12 mm. in length. Controlled plantings of this species might serve to clarify the worth of the sub-species or varieties which are distinguished.

* ***Melampyrum lineare*** Desr. var. ***latifolium*** Bart. Open oak woods; rare. Riverside Junction, *S & F* 23114. This is good material of the variety. Most of the plants from this region, which would be placed under subsp. *latifolium* (Muhl.) S60 by Pennell (1935), are referable to var. *americanum* (Mx.) Beauverd. It is interesting that the range of var. *americanum* strongly overlaps that of the other races (Gleason, 1952).

Veronica scutellata L. Marshes; infrequent. Vicinity of Limestone, *S & F* 23153; *S et al.* 23524; South Vandalia Oxbow, *S & E* 26322; Pickup's Pond, Randolph, *Porter et al.* (St. B 2396); near Onoville,

Gordon (St. B 2395); observed at Carrollton. Definitely cited only from vicinity of Cold Spring and Quaker Bridge. Infrequent in western New York.

Utricularia vulgaris L. subsp. ***macrorrhiza*** (Le Conte) Clausen (*U. macrorrhiza*; *U. vulgaris auct. amer.*—Clausen, 1949). Oxbows; rare. South Vandalia, S & E 26323. Reported from the Tunungwant Valley. Common in the watershed (McVaugh, 1938), but cited specifically only from the lakes.

Phryma leptostachya L. Open oak woods; rare, but possibly overlooked. Killbuck, S *et al.* 27728. Probably frequent outside of the mountains. Reported from the vicinity of Limestone and of Randolph.

Cephalanthus occidentalis L. Oxbows along the river; local. Observed at South Vandalia, Vandalia and Horseshoe. Reported only from Allegany and Randolph. Frequent in western New York.

* ***Galium pilosum*** Ait. subsp. ***pilosum*** (Stone—1911). Open oak woods; rare. Riverside Junction, S *et al.* 23107. This species is local in the State and rather rare in western New York. Apparently rare in northwestern Pennsylvania.

Lonicera dioica L. var. ***dioica***. Open woods; rare. St. Bonaventure, E *et al.* (St. B 2481). Otherwise known only from the benches opposite Red House. Frequent in western New York.

* ***L. sempervirens*** L. Woods; rare. Elko Mountain, *Gordon et al.* (St. B 2476) (as *L. dioica*). Several scattered stations about the Allegheny Plateau; more frequent on Long Island. Jennings cites it as rare and suggests it is an escape.

Triosteum perfoliatum L. var. ***aurantiacum*** (Bickn.) Wieg. (*T. perfoliatum auct.*, p. p.; *T. aurantiacum*). Open oak woods and bottom land thickets; more frequent than indicated. Carrollton, S & F 23386; Horseshoe, S & E 26373; Killbuck, S & E 26467; S *et al.* 27709; west of Red House, S *et al.* 24416; Elko, S *et al.* 22750; observed at Riverside Junction and opposite Red House. Reported from St. Bonaventure, Quaker Run and Peters Run. Infrequent in western New York.

Viburnum opulus L. subsp. ***trilobum*** (Marsh.) Clausen (*V. opulus auct.*; *V. trilobum*; *V. opulus* var. *americanum*—Clausen, 1949). Bottom land woods; two more stations. Carrollton, S & F 23396; Horseshoe, S *et al.* 23469. Infrequent in western New York. The specimens found by this investigator were near the sites of longhouses. It is possible the species was planted by the Iroquois.

Aster lowricanus Porter. Open oak woods; local. Killbuck, S *et al.* 27720. Reported only from near Red House and as frequent in the park (Knobloch, 1937). Rare (?) in western New York, but common in western Pennsylvania.

A. novae-angliae L. Bottom lands; rare as stated. Observed at Horseshoe and Vandalia. No stations were cited, previously. Common in most of the lowlands of the State; common in western Pennsylvania. Its rarity in this valley is unexplainable at present.

A. paternus Cronquist (*Sericocarpus asteroides*). Open oak woods, etc.; infrequent. Observed at a new station upriver from the others; Killbuck. Rare in western New York; common in the uplands of western Pennsylvania.

A. sagittifolius Wedem. Dry old fields and open woods; frequent near the River. Killbuck, *S et al.* 27719; west of Red House, *S & F* 24425; Cold Spring, *S et al.* 22672; observed at Horseshoe. Previously reported only from Sunfish Run, near Red House and the vicinity of Elko (Knobloch, 1937, *inter alius*). Common in western New York.

* **Bidens comosa** (Gray) Wieg. (incl. in *B. tripartita* by Cronquist—Gleason, 1952). Mucky places along the river; rare. Horseshoe, *S et al.* 27752. Frequent in western New York.

B. vulgata Greene. In similar habitats; infrequent. Two more stations, upriver. Killbuck, *S et al.* 27714; observed at Horseshoe. Frequent in western New York.

Cacalia suaveolens L. Bottom land woods; scarce. Horseshoe, *S & E* 26384; river islands below Red House, *S et al.* 23602, 23716; between Quaker Bridge and Cold Spring, *Alexander*, August 25, 1927; south of Quaker Bridge, *Saunders* (St. B 2776). Rare according to Zenkert, who considers it adventive; not common in western Pennsylvania.

* **Cirsium discolor** (Muhl.) Spreng. Fields and thickets near the river; frequent as in other large valleys of the State. North of Cold Spring, *S et al.* 23786; Elko, *S et al.* 22761; near Allegheny River, Allegheny State Park, *Wagner* (St. B 2790); observed at Horseshoe, west of Red House, south of Steamburg and at Oldtown. The Wagner specimen was labeled *C. lanceolatum*.

* **C. pumilum** (Nutt.) Spreng. (*C. odoratum*). Old fields; scarce. Red House Lake, *S et al.* 23715; near bogs north of Steamburg, *S et al.* 23761; observed at Oldtown. Originally reported from Quaker Run, but this record was deleted later. Possibly new to western New York, the only earlier record being doubtful (Zenkert, 1934).

* **Erigeron philadelphicus** L. Fields and waste places; rare (?) Allegany, *anon.* (St. B 2710). Frequent in most parts of the State, outside the mountains; infrequent on the High Plateau.

E. pulchellus Mx. Open oak woods; scarce. Killbuck, *S et al.* 26474; observed opposite Red House. Reported from "Allegheny State Park" and St. Bonaventure. Jennings says: "avoiding the High Plateau."

Eupatorium fistulosum Barratt (*E. purpureum* auct., p. p.). Low grounds; rare. Quaker Bridge, *Alexander*, August 26, 1926; near Kents Corners, *Fenton* 102; observed north of Quaker Bridge. This should be the *E. purpureum sensu* Wiegand of the House and Alexander flora, but not all the specimens so named belong here. This striking species is certainly local; Jennings, who has made a special study of the complex, found no specimens from southwestern New York. *E. maculatum* L. and true *E. purpureum* L. (*E. falcatum* Mx.) are about equally common in the valley.

Helenium autumnale L. Riverbanks; frequent as elsewhere in the State, outside of the mountains. Several collections and observations were made.

Helianthus decapetalus L. Low grounds; frequent along the river and elsewhere. Cold Spring, *S et al.* 22671; north of Elko, *S et al.* 22698; one mile south of Steamburg, *E & Donahue* (St. B 3217); observed at mouth of Tenmile Creek and at Horseshoe. Reported only from near Elko. Frequent in western New York.

Hieracium venosum L. Open oak woods and banks nearby; not infrequent. New stations east of the park are: one and one-half miles north of St. Bonaventure, *E & Donahue* (St. B 2815); five miles west of Allegany, *E* (St. B 2813); Riverside Junction, *S et al.* 23111; observed east of Allegany. Infrequent in western New York.

Lactuca hirsuta Muhl. Thickets on site of cutover oak woods; rare. Near Red House, *Alexander & House* 12893 (as *L. canadensis*). The specimens belong to *f. calvifolia* Fern. (*f. calvescens*—Fernald, 1920). The species is rare and local in the State as in Pennsylvania. Jennings cites var. *hirsuta* without definite station from "Allegany Park."

Prenanthes altissima L. Woods; more frequent than indicated. St. Bonaventure, *E. H. Donahue* (St. B 2809); Horseshoe, *S et al.* 27758; west of Red House, *S et al.* 24429; observed near Salamanca Rock City. Apparently common in western New York and western Pennsylvania.

* **P. crepidinea** Mx. Thickets in bottom lands; rare. South Vandalia Oxbow, *S & E* 26316; Horseshoe, *S et al.* 26391, 27759. The only previous reports for this State were for Buffalo, where the most recent date of collection known to the author is 1844. Rare in western Pennsylvania. The stations are apparently slightly east of any previously recorded. Both localities are on sites of Indian villages and one wonders if the species were introduced by them.

Senecio obovatus Muhl. Open woods; rare. Killbuck, *S & E* 26473. Although reported as infrequent by House and Alexander, they cite it only from Quaker Run. A third station is known, slightly to the north-east. The species is rare in this State outside of the counties bordering the Hudson. Avoiding the High Plateau, according to Jennings.

Solidago canadensis L. Low woods and thickets near the river; frequent. West of Red House, *S et al.* 24423; observed at Horseshoe and Salamanca Rock City. Reported only from Gardner's Rocks. Common in western New York.

S. patula Muhl. Bogs, swamps and springy places in woods; frequent. Carrollton, *S & F* 23397; Killbuck, *S et al.* 27716; near Onoville, *Gordon* (St. B 2592); observed in Mount Moriah Swamp, at Riverside Junction, about the bogs north of Steamburg and on the south side of Conewango. Previously considered rare and reported only from Sunfish Run. Frequent in western New York.

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An Ecological Survey of Amphibians, Reptiles, and Mammals of Allegany Indian Reservation and Vicinity

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During July and August 1957, a zoological survey was conducted in the Allegheny River Valley, Cattaraugus County. The purpose of the survey was to determine species of amphibians, reptiles, and mammals (primarily small mammals) present in the Allegany Indian Reservation, to check various ecological relationships of these species and to estimate probable effects of flooding on these forms. Birds and fish were not considered in detail since they have been studied by the U.S. Fish and Wildlife Stream Survey and ornithologists working in the area (Cañalane, 1928; Eaton, E. H., 1910, 1914; Eaton, S. W., 1953; Saunders, 1923, 1925, 1936, 1938, 1942).

The project, under the sponsorship of the New York State Museum and Science Service, was carried out by Dr. Margaret Stewart, and assistants Gary Larson and Thomas Watthews. It was completed during the period from July 5-August 28.

A series of areas representing a variety of habitats were chosen for study. Thirty-eight such areas were examined. Many were checked repeatedly over a period of time, especially those in which traplines were set. The majority of study sites were located in the area extending from State Line Road, less than one-quarter mile from the Pennsylvania border on the west side of Allegany State Park, to Red House Station. Several localities outside the area of possible impoundment were examined in order to check for differences in populations and possible habitats for forms which would be forced out of the bottom lands. All reference points correspond to the 1943 U.S.G.S. topographic sheets of Salamanca and Randolph quadrangles.

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The presence and numbers of large mammals were estimated by chance sight, tracks, scats and markings left by the animals. Small mammals were considered more in detail since less work has been done on them in this region. They were taken in traplines or grids of small and large snaptraps baited with a mixture of oatmeal and peanut butter. Measurements and weights, data on reproductive activity, as well as habitat notes, were taken on all small mammals collected, and a representative series of skins was prepared. Complete data sheets and skins have been deposited in the zoology office of the New York State Museum. Ectoparasites were preserved and identified by a specialist. Results are given in table IV. Snakes and salamanders were obtained by turning over rocks, logs and debris in appropriate habitats. Turtles and frogs were taken by surprise with a large dip net or by hand. Only representative samples of each species seen were taken. Most observations were made and data recorded in the field, thereby allowing the animals to remain in their habitats.

Vegetation on the reservation consists primarily of second growth deciduous forests—oak, hickory, beech, birch, maple, hemlock—in the higher woodlands. Along the river there is a border of silver maple, sycamore, and willow interspersed with various other less common species and shrubs. Much of the reservation is either cultivated or abandoned farmland. Abandoned fields are overgrown with weeds, primarily asters and goldenrod, bracken, shrubs, or thickets of oak, wild cherry, sumac and aspen. Detailed information on the vegetation of the region is available in previous museum publications (Gordon, *et al.*, 1937; House and Alexander, 1927; Taylor, 1928).

Shale-covered slopes along roadsides and streams afforded excellent hiding places for snakes. Many small streams, with rubble and shale-covered bottom yielded several species of salamanders. Dry weather, especially during the latter part of the summer, was responsible for the drying of many streams, or "runs," and probably accounted for the difficulty in finding some species which were expected but not seen.

Scientific names of reptiles and amphibians are in accordance with Schmidt (1953) and common names follow those used by the Committee on Herpetological Common Names (1956). Latinized names of mammals follow Miller and Kellogg (1955); common names are those used by Hamilton (1943). Identifications of all animals were made with the aid of appropriate handbooks (see list of references). Where the subspecies of mammals could not be determined without a taxonomic study of a larger series of animals, subspecific names were omitted.

Species seen or taken during the summer are listed. Several animals are known to be present in the area from previous investigations but were not taken during the summer. These are included in a separate listing, with the source of information indicated.

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LIST OF SPECIES TAKEN OR SEEN

Class Amphibia

Salamanders—Order Caudata

Necturus maculosus maculosus Rafinesque—Mudpuppy

Diemictylus viridescens viridescens Rafinesque—Red-spotted Newt, Red Eft

Desmognathus fuscus fuscus Rafinesque—Northern Dusky Salamander

Desmognathus ochrophaeus ochrophaeus Cope—Allegheny Mountain Salamander

Plethodon cinereus cinereus Green—Red-backed Salamander

Plethodon glutinosus glutinosus Green—Slimy Salamander

Plethodon wehrlei Fowler and Dunn—Wehrle's Salamander

Hemidactylium scutatum Schlegel—Four-toed Salamander

Gyrinophilus porphyriticus Green—Northern Spring Salamander

Eurycea bislineata bislineata Green—Northern Two-lined Salamander

Frogs and Toads—Order Salientia

Bufo terrestris americanus Holbrook—American Toad

Hyla crucifer crucifer Wied—Northern Spring Peeper

Rana catesbeiana Shaw—Bullfrog

Rana clamitans Latreille—Green Frog

Rana sylvatica sylvatica Le Conte—Eastern Wood Frog

Rana pipiens pipiens Schreber—Northern Leopard Frog

Rana palustris Le Conte—Pickerel Frog

Class Reptilia

Turtles—Order Chelonia

Chelydra serpentina serpentina Linnaeus—Common Snapping Turtle

Chrysemys picta marginata Agassiz—Midland Painted Turtle

Trionyx ferox spinifera LeSueur—Eastern Spiny Soft-shell

Lizards—Order Sauria

Eumeces anthracinus anthracinus Baird—Northern Coal Skink

Snakes—Order Serpentes

Natrix sipedon sipedon Linnaeus—Northern Water Snake*Storeria dekayi dekayi* Holbrook—Northern Brown Snake*Storeria occipitomaculata occipitomaculata* Storer—Northern Red-bellied Snake*Thamnophis brachystoma* Cope—Short-headed Garter Snake*Thamnophis sirtalis sirtalis* Linnaeus—Eastern Garter Snake*Diadophis punctatus edwardsi* Merrem—Northern Ring-necked Snake*Opheodrys vernalis vernalis* Harlan—Eastern Smooth Green Snake*Lampropeltis doliata triangulum* Lacépède—Eastern Milk Snake*Crotalus horridus horridus* Linnaeus—Timber Rattlesnake

Class Mammalia

Order Marsupialia

Didelphis marsupialis virginiana Kerr—Opossum

Order Insectivora

Sorex cinereus cinereus Kerr—Common Shrew*Sorex fumeus fumeus* Miller—Smoky Shrew*Blarina brevicauda* Say—Short-tailed Shrew

Order Chiroptera

Myotis lucifugus lucifugus LeConte—Little Brown Bat*Pipistrellus subflavus obscurus* Miller—Pipistrelle

Order Lagomorpha

Sylvilagus floridanus Allen—Eastern Cottontail

Order Rodentia

Marmota monax rufescens Howell—Rufescent Woodchuck*Tamias striatus lysteri* Richardson—Northeastern Chipmunk*Sciurus carolinensis pennsylvanicus* Ord—Northern Gray Squirrel*Tamiasciurus hudsonicus loquax* Bangs—Southern Red Squirrel*Castor canadensis* Kuhl—Beaver*Peromyscus maniculatus*—Deer Mouse*Peromyscus leucopus noveboracensis* Fischer—Northern White-footed Mouse*Synaptomys cooperi cooperi* Baird—Cooper's Lemming Mouse*Clethrionomys gapperi* Vigors—Red-backed Mouse*Microtus pennsylvanicus pennsylvanicus* Ord—Field Mouse*Ondatra zibethicus zibethicus* Linnaeus—Common Muskrat*Zapus hudsonius hardyi* Batchelder—Meadow Jumping Mouse*Napaeozapus insignis insignis* Miller—Woodland Jumping Mouse*Erethizon dorsatum dorsatum* Linnaeus—Porcupine

Order Carnivora

Vulpes fulva fulva Desmarest—Red Fox*Euarctos americanus americanus* Pallas—American Black Bear*Procyon lotor lotor* Linnaeus—Eastern Raccoon*Mephitis mephitis nigra* Peale and Palisot de Beauvois—Eastern Skunk

Order Artiodactyla

Odocoileus virginianus borealis Miller—Northern Virginia Deer

SPECIES REPORTED PREVIOUSLY FROM THE AREA; NOT TAKEN DURING PRESENT SURVEY

Amphibians

- Cryptobranchus alleganiensis* Daudin—Hellbender (Bishop, 1927; 1941)
Ambystoma jeffersonianum Green—Jefferson Salamander (Bishop, 1927; 1941)
Ambystoma maculatum Shaw—Spotted Salamander (Bishop, 1927; 1941)
Pseudotriton ruber ruber Sonnini—Northern Red Salamander (Bishop, 1927)
Hyla versicolor versicolor LeConte—Eastern Gray Treefrog (Bishop, 1927)

Reptiles

- Stenotherus odoratus* Latreille—Stinkpot (Bishop, 1927)
Clemmys guttata Schneider—Spotted Turtle (Bishop, 1927)
Clemmys insculpta LeConte—Wood Turtle (Bishop, 1927)
Thamnophis sauritus Linnaeus—Ribbon Snake (Bishop, 1927)
Elaphe obsoleta obsoleta Say—Black Rat Snake (Bishop, 1927)

Mammals

- Sorex palustris albibarbis* Cope—White-lipped Water Shrew (Eaton, 1945)
Parascalops breweri Bachman—Hairy-tailed Mole (Knobloch, 1943)
Condylura cristata cristata Linnaeus—Star-nosed Mole (Knobloch, 1943)
Lepus americanus Erxleben—Varying Hare (Knobloch, 1944)
Sylvilagus transitionalis Bangs—New England Cottontail (Knobloch, 1944)
Glaucomys volans volans Linnaeus—Small Eastern Flying Squirrel (Knobloch, 1944)
Glaucomys sabrinus sabrinus Shaw—Northern Flying Squirrel (Knobloch, 1944)
Rattus norvegicus Berkenhout—Norway Rat (Knobloch, 1944)
Mus musculus domesticus Ratty—House Mouse (Knobloch, 1944)
Urocyon cinereoargenteus cinereoargenteus Schreber—Gray Fox (Knobloch, 1944)
Mustela erminea cicognanii Bonaparte—Bonaparte's Weasel (Knobloch, 1944)
Mustela frenata noveboracensis Emmons—New York Weasel (Knobloch, 1944)
Mustela vison mink Peale and Palisot de Beauvois—Southeastern Mink (Knobloch, 1944)
Lynx rufus rufus Schreber—Bobcat (Knobloch, 1944)

SPECIES TAKEN NOT PREVIOUSLY REPORTED FROM THE AREA

Hemidactylium scutatum Schlegel—Four-toed Salamander
Eumeces anthrocinus anthrocinus Baird—Coal Skink
Trionyx ferox spinifera LeSueur—Eastern Spiny Soft-shell
Pipistrellus subflavus obscurus Miller—Pipistrelle

SPECIES ACCOUNTS OF AMPHIBIANS AND REPTILES

An annotated list of the observed species follows. Remarks of general abundance, as indicated by observations during the field studies, and special observations of interest are included. The list of "associated species" includes other vertebrates which were found within the immediate vicinity of the species under consideration. One kind of invertebrate was found in numbers large enough to warrant mention. Crayfish were extremely abundant in the Allegheny River and all its tributaries. They were the most abundant group observed in these aquatic habitats. Although they are not mentioned in each account, they might well influence the amount of food available for most of the aquatic vertebrates and might even prey upon some of them, especially in the larval stages.

A list of collection sites for all species with details of the habitats and dates of collections is given in table I. The corresponding name or number of each site is used when mentioned subsequently.

MUDPUPPY

This handsome salamander was found in three localities, all near the mouth of some tributary of the Allegheny River—Quaker Run, Wolf Run and Sawmill Run. Eleven nesting adults, presumably females, were found July 10 in Quaker Run in a 200-yard stretch above the railroad bridge crossing. This is the area described as a suitable habitat by Bishop (1927). Eggs were attached to the lower surface of large flat rocks, in water up to two and one-half feet deep. Adults were guarding 10 of the nests. Eggs varied in number from 25 to 150, the usual complement numbering about 100. Eggs were three-fourths inch in diameter, and larvae were in the hind limb bud stage. The same area was examined August 28. One adult was seen; it was under a large flat rock in one foot of water. A few egg membranes were still attached to the nest rocks; no larvae were seen, but the water was extremely turbid due to recent rain.

Nests were also found in Wolf Run (one nest 400 yards upstream from mouth; adult attending about 100 eggs) and Sawmill Run. There, four nests were found 200-300 yards from the mouth of the run. Three of the nests (under large slabs of rocks in six to eight inches of water) were attended by adults. When such a nest site was lifted and the adult

exposed, the mudpuppy made no effort to escape unless disturbance was continued. Instead, it nestled closer to the rock. All movements were slow unless the animal was actually touched continually for several minutes. Then it would swim away very rapidly several yards from the rock. When all was again quiet, it would return slowly but directly to the rock.

Records:

July 10, Quaker Run, above railroad bridge, Wolf Run Road, 11 nests with adults in attendance.

July 11, Wolf Run, 400 yards from mouth in pool in wide area of creek, 1 nest with adult attending.

July 16, Sawmill Run, 4 nests with adults attending, 1 carcass in creek.

Aug. 28, Quaker Run, 1 adult, with swollen vent, under rock in 1½-foot of water about ¼-mile below nesting area.

RED-SPOTTED NEWT; RED EFT

This species was seen more often in the terrestrial stage than as aquatic adults. Adults, however, were common in pools and backwaters along Sawmill Run, State Line Run and Red House Lake. Efts were seen in great abundance August 29 after three rainy days. They were apparently migrating to the water at this time. About 20 large individuals were seen in about 200 yards crossing A.S.P. No. 2 on the northeast side of Red House Lake. Numbers were less concentrated in adjacent areas. On the same day, many were seen crossing Route 17, west of Olean, in a wooded area. Except for this observation, efts were solitary or seen in small numbers. Three large bright ones were encountered around the same stump on the mixed hardwood slope by State Line Road.

Associated species:

Green frog

Records:

July 8, State Line Road, 3 red efts in woods—adults common in pools.

July 10, Quaker Run, Wolf Run Road, 1 red eft in woods.

July 11, Wolf Run, 1 red eft on hemlock slope.

July 16, Sawmill Run, adults common in pools and backwaters of stream.

Aug. 23, State Line Road, red eft in road ditch.

Aug. 29, Red House Lake, red efts abundant crossing highway.

NORTHERN DUSKY SALAMANDER

This is one of the most common salamanders in the area. They are less common, however, than their near relative, the mountain salamander, which was almost ubiquitous. Individuals showed a great deal of variation in color and pattern. Some were very dark with faint mottling, while others were light with pronounced pattern, even in large adults. One large male taken in State Line Run was very similar in appearance to the seal salamander, *Desmognathus phoca*.

Associated species:

Mountain salamander

Two-lined salamander

Spring salamander

*Records:*July 8, State Line Run, 1 subadult, 5 adult males taken, 2 resembling *D. phoca*.

July 11, Wolf Run, 2 adults by edge of run.

July 16, Sawmill Run, all sizes common along creek.

July 17, State Line Run, along dry stony run by logging road on north side of road.

July 22, Quaker Run, Blacksnake Mountain by Science Lake, several along run and in draws on slope above lake.

July 29, Bone Run, 7 large adults taken, smaller ones common.

July 30, Bone Run, all sizes abundant, 6 (4½-inch) males, 1 large female taken, others smaller to one-year size.

Aug. 7, Quaker Run, near Friends Indian School, shaded hemlock and shale ravine, 3 large males.

Aug. 25, Bear Springs, several in small stream.

ALLEGHENY MOUNTAIN SALAMANDER

This was the most common salamander observed in the area. It could be found under rocks in almost any damp woods either very near the water or within 100-200 yards of a source of moisture. This does not mean that they were restricted to such a situation, but they were less common at greater distances from water. They were never found in an area which was not wooded or where shade was not abundant. Along the stream banks, they were frequently in company with the two-lined and dusky salamanders, and in drier situations were sometimes taken under the same rock as the red-backed salamander or Wehrle's salamander. The species was abundant along State Line Run and Bone Run where individuals showed much variation in color and pattern. In the park they were even more abundant than on the reservation; this was probably due to more abundant moisture in the dense woods.

Associated species:

Dusky salamander

Two-lined salamander

Red-backed salamander

Wehrle's salamander

Slimy salamander

Pickerel frog

Records:

July 8, State Line Run, common along run and small tributaries.

July 10, Quaker Run, near railroad bridge, 10 adults in a 25-yard transect on wooded slope.

July 11, Wolf Run, 2 adults under rocks at edge of run.

July 16, Sawmill Run, several along draws and creek.

July 17, State Line Road, abundant in bed of dry stony tributary near logging road.

- July 22, Blacksnake Mountain, all sizes abundant, almost every rock or log harbored one or more individuals.
July 28, Bear Cave slope, common under rocks along draw.
July 29, Bone Run, off Little Bone Run Road, all sizes common.
July 30, Bone Run, 5 adults (3 females, 2 males) taken which show much variety of color pattern.
Aug. 6, Quaker Run, McCabe trail, common in woods with red-backed salamander.
Aug. 25, Bear Springs, common along streams.

RED-BACKED SALAMANDER

This species was encountered in the same type of habitat as the mountain salamander, but not in such abundance in most areas. On August 6, two nests of 8-10 eggs, each guarded by the adult, were found under embedded flat rocks in the woods just south of McCabe Trail. This was the only species of salamander seen in the sphagnum Bear Bog in the park.

Associated species:

Mountain salamander
Wehrle's salamander

Records:

- July 8, State Line Run, several by small tributaries.
July 9, Sphagnum Bear Bog, 8 adults, 4 subadults in and under rotten logs and bark, bog wet.
July 10, Quaker Run, near railroad bridge, 7 adults on wooded slope.
July 22, Blacksnake Mountain, common on wooded slope.
July 28, Bear Caves, few adults under rocks on wooded slope.
Aug. 6, Quaker Run, McCabe Trail, 2 nests under rocks in woods.
Aug. 25, Bear Springs, common under rocks and logs.

SLIMY SALAMANDER

This is one of the more handsome salamanders of the area, but it is seldom encountered. Only six individuals were seen during the summer. As the records show, it is not restricted to moist situations.

Associated species:

Red-backed salamander

Records:

- July 11, Elko Mountain, 1 6-inch adult under shale slab on railroad cut, in the sun; 2½-inch subadult under bark of rotten stump on hemlock slope.
July 20, English Creek, 1 subadult under rock in woods.
July 26, Gypsy Trail, under large slab in cabin yard, in the sun.
July 28, Bear Caves slope, adult under rock by moist draw.
July 30, Bone Run, large adult under slab on south-facing wooded slope.

WEHRLE'S SALAMANDER

This is one of the very rare salamanders of New York. Allegany State Park is one of the few areas in which it has been found. It was seen in 1957 at the same site where it was first discovered in the State 30 years ago. Five adults were seen on the slope of Blacksnake Mountain above the powerline cut south of Science Lake. All were under partially embedded large rocks (at least one foot in diameter). The slope was quite dry since there had been little rain recently. They moved very slowly when captured.

Associated species:

Red-backed salamander
Mountain salamander

Record:

July 22. Blacksnake Mountain, 2 adult males (4 $\frac{3}{4}$ -inch, 5-inch) and 3 adult females (3 $\frac{3}{8}$ -inch; 3 $\frac{1}{2}$ -inch; 4 $\frac{1}{4}$ -inch).

FOUR-TOED SALAMANDER

Although this species has never been discovered in the reservation or in the park, it might be expected to occur in Bear Bog and the Fir Tree Swamp, two known sphagnum-covered areas in the park. It was discovered at Keith's Bog, near Steamburg. One adult was taken from under a piece of old tar paper on a dry sunny blueberry slope overlooking the almost dry bog.

Associated species:

Common garter snake
Short-headed garter snake
Ring-necked snake
Red-bellied snake

Record:

July 26, Keith's Bog, 1 adult.

SPRING SALAMANDER

This aquatic species was not observed in large numbers but was seen in widely scattered areas. It was not always in wooded areas. A small larva was taken in an open meadow-bordered section of State Line Run, another in a tiny exposed rocky stream flowing out of an oak-hickory slope at Bradford Junction. They were more common at Bear Springs, a cold spring-fed brook, than anywhere else.

Associated species:

Dusky salamander
Mountain salamander
Two-lined salamander

Records:

July 8, State Line Run, 1 2-inch larva.
July 9, Bradford Junction, 1 2-inch larva.
July 11, Wolf Run, 1 small larva.

- Aug. 4, Quaker Run, McCabe Trail, 2 adults ($4\frac{1}{2}$ -inch, $5\frac{1}{2}$ -inch), 2 larvae ($3\frac{1}{2}$ -inch, $4\frac{1}{2}$ -inch).
Aug. 6, same locality, 1 adult ($5\frac{1}{2}$ -inch), 4 larvae (2-inch, 4-inch).
Aug. 25, Bear Springs, 1 adult (7-inch), transforming larva (4-inch), 6 larvae ($2\text{--}3\frac{1}{2}$ -inch).
Aug. 26, same locality, 3 large larvae.

TWO-LINED SALAMANDER

The only sites where this species was found in abundance were in Sawmill Run, below the bridge near Onoville and in the north fork of Bone Run. Adults of this species are often difficult to find during the summer months, but, if they are present in an area, larvae are easily detected under stones in shallow water. Although more common in shaded areas, this species is not restricted to wooded sites.

Associated species:

Dusky salamander

Mountain salamander

Spring salamander

Records:

July 8, State Line Run, 1 subadult in transformation, 1 two-year larva.

July 16, Sawmill Run, 7 adults, 10 transforming subadults, and 6 two-year larvae in 25 yards of streambed.

July 23, Meetinghouse Run, near Red House, several two-year larvae under rocks in shallow, partially shaded portions of small stream.

July 29, Bone Run, north fork, off Little Bone Run Road, all sizes from young of the year to large adults in stream and on slope.

July 30, Bone Run, north fork, 6 large adults (3 over 4 inches), 2 recently transformed subadults, in wooded area.

Aug. 25, Bear Springs, 1 adult female.

Aug. 29, Quaker Run, near mouth, 2 large adult females under rocks at edge of creek.

AMERICAN TOAD

These were seen in several localities, and are apparently one of the more common anurans seen during the summer months. Sizes ranged from recently transformed individuals common along streams and ponds to large adults three and one-half inches in body length.

Associated species:

Newt

Leopard frog

Pickerel frog

Records:

July 8, State Line Run, adult on anthill by stream.

July 9, Bradford Junction, adult under shale slab, exposed on sunny dry slope.

July 10, Quaker Run, Wolf Run Road, adult under rock by creek.

July 16, Sawmill Run, small adults under rocks by stream.

- July 22, Science Lake, 1 recently transformed individual by lake.
Aug. 6, large island in river near Quaker Bridge, adult female (3½ inches) in grass.
Aug. 7, small clearing on A.S.P. No. 1, adult female (3½-inch) in wet grass.
Aug. 13, 14, gravel pit, small recently transformed individuals around edge of water.

NORTHERN SPRING PEEPER

These tiny frogs were seen only once during the summer, but were heard singing (singly, rather than in chorus) at three different sites.

Records:

- July 19, Tunungwant Swamp, recently transformed individuals in large numbers on leaves of weeds and sedges in open sun.
Aug. 13, 14, gravel pit, heard singing in woods in the sunny morning.
Aug. 24, woods by Stoddard Creek 1 mile south of Red House Lake, heard singing at dusk.
Aug. 25, Twin Springs, A.S.P., heard singing at dusk after misty afternoon.

BULLFROG

The only previous record of this frog was from the Tunungwant Swamp (Bishop, 1927). Although seen several times on the reservation, it was never observed in the park during the present study.

Associated species:

- American toad
Leopard frog
Green frog

Records:

- July 11, Wolf Run, large adult between rocks under railroad bridge.
July 16, Sawmill Run, 2 large tadpoles with hind legs, in pool near road.
July 23, gaging station, a half-eaten carcass near the water; adult by river.
Aug. 13, 14, gravel pit, by edge of pond.

GREEN FROG

This is the frog most commonly seen in the study area.

Associated species:

- Newt
Leopard frog
Bullfrog
Wood frog

Records:

- July 8, State Line Run, transforming tadpoles, in pools by run.
July 16, Sawmill Run, 1 tadpole, hind legs, 1 recently transformed individual.

July 19, Tunungwant Swamp, common along creek: adults and tadpoles.

July 25, Keith's Bog, large adult male in meadow.

July 29, North fork, Bone Run, all sizes abundant along stream and in meadow.

Aug. 9, Balsam Fir Swamp, 1 adult taken in snaptrap by little pool.

Aug. 13, 14, gravel pit, several small adults in muddy road ruts.

WOOD FROG

The wood frog is not often seen during the summer months. Only three adults were seen during the entire study; one of these was taken in a snaptrap.

Associated species:

Newt

Mountain salamander

Dusky salamander

Leopard frog

Records:

July 8, State Line Road, transforming individuals in pools by run.

July 30, Bone Run Road, adult caught in snaptrap in old orchard.

Aug. 4, McCabe Trail, 1 adult in woods.

Aug. 7, Quaker Run rental office, adult in window well.

NORTHERN LEOPARD FROG

Although Bishop (1927) found this to be one of the most common frogs in the area, it was rarely seen during this study.

Associated species:

Dusky salamander

Mountain salamander

Green frog

Wood frog

Pickerel frog

Records:

July 22, Science Lake, 2 small adults by lake.

July 23, Keith's Bog, small adult in little swale.

July 30, Bone Run, 1 adult.

Aug. 14, gravel pit, several adults, both green and brown phase around pond.

PICKEREL FROG

This species was seen in situations similar to those of the closely related leopard frog. Both species seem to be rather rare in the area.

Associated species:

Leopard frog

American toad

Records:

July 22, Science Lake, small transformed individuals by water.

July 29, Bone Run, 1 adult by stream.

Aug. 5, Seneca Trading Post, Quaker Bridge, large adult male in grassy area, recently mowed for hay.

COMMON SNAPPING TURTLE

Bishop (1927) reported this species only from the Tunungwant Valley. In the present study it was located in the Quaker Run area of the park and in the reservation.

Associated species:

Spring peeper

Leopard frog

Green frog

Bullfrog

Records:

July 19, Tunungwant Swamp, in small pool of water in sun. Carapace $4\frac{1}{2}$ inches long.

Aug. 13, gravel pit, algal-covered carapace scales found at edge of water.

Aug. 25, Quaker Run, in rocky run near western edge of park, very aggressive adult; carapace 10 inches long.

MIDLAND PAINTED TURTLE

Although Bishop (1927) stated that this was one of the commonest turtles in the area, it was seen in only two sites during the summer, neither of which is actually in the park.

Associated species:

Soft-shell

American toad

Leopard frog

Green frog

Records:

Aug. 2, Quaker Bridge, 1 subadult sunning on lily pad in garden pool of local resident.

Aug. 13, 14, gravel pit, several adults sunning on beaver house.

Aug. 25, gravel pit, one adult taken from small shallow backwater.

EASTERN SPINY SOFT-SHELL

This turtle had not been previously reported from the area although the county is within the range given by Carr (1952). One specimen was taken as it burrowed into the mud of a backwater of the Allegheny River near the mouth of Red House Brook. Harry Kilburn, manager of the Red House Lake concession, reported that the gravel pit near Red House was used as a source of soft-shelled turtles by the Indians.

Upon his suggestion, we tried catching them there, but with no success. One line was stolen and the other had 10 of 12 baited No. 4 fishhooks bitten from it.

Associated species:

Bullfrog
Leopard frog
Green frog
American toad
Painted turtle

Records:

July 23, Allegheny River, backwater about 1 mile west of Red House,
1 adult; carapace 7 inches long.
Aug. 13, gravel pit, small individual seen sunning on beaver house.

COAL SKINK

Although this species is fairly common in a few areas of central New York and in Pennsylvania, it had not previously been reported from the Allegany State Park region.

One individual was seen crossing a small logging road off State Line Road July 17. The spot was in the sun at 11 a.m. when the observation was made. The lizard escaped capture, but on a hot sunny afternoon, August 23, a concerted effort was made to collect a specimen. Three adults were uncovered within 2 yards of each other, a spot about 10 yards from where the first observation was made. They were under small shale slabs in a tiny open brushy area by the edge of the woods on the road cut. Brush from a felled tree had accumulated and begun to rot, creating a porous soil of sawdust and humus. One individual released its tail when captured.

Records:

July 17, State Line Road, 1 seen in woods by road.
Aug. 23, same site, 3 adults.

NORTHERN WATER SNAKE

Only one water snake was taken during the summer. It was coiled under a flat stone in the shallow Meetinghouse Run.

Associated species:

Two-lined salamander
Johnny darters

Records:

July 23, Meetinghouse Run, 1 young adult, color pattern pronounced.
July 23, gaging station, Allegheny River, 1 adult fell into water from sunning on debris.
July 24, Allegheny River, 2 adults seen swimming into water when frightened from riverbank.
Aug. 23, Red House Lake, 1 large adult frightened into water from sunning in rushes.

NORTHERN BROWN SNAKE

Only one brown snake was seen during the entire study. It was under a small stone on a roadbank in company with red-bellied snakes.

Associated species:

Red-bellied snake

Record:

July 6, Bone Run Road, 1 adult.

RED-BELLIED SNAKE

This snake and the short-headed garter snake were the two snakes most commonly seen in the area. Individuals were always taken from under rocks where they remained quietly in a coil, even after being exposed. Not until they were touched did they make an effort to escape.

Associated species:

Common garter snake

Short-headed garter snake

Ring-necked snake

Brown snake

Records:

July 6, Bone Run Road, several adults under rocks on roadbank, both brown and gray color phases seen.

July 10, Quaker Run, near Wolf Run Road, 1 adult under rock near dump, in shade.

July 11, Wolf Run, near mouth, 2 adults, one under shale slab by railroad track, other under rock by road.

July 25, Keith's Bog, 1 adult under debris and tar paper on dry slope above bog—under same pile of paper as a common garter snake.

Aug. 16, gaging station, 1 adult under wooden slab in open field.

Aug. 22, Randolph Fish Hatchery, 1 adult under rock by fish pools.

Aug. 27, Gypsy Trail, 1 adult under rock by road.

SHORT-HEADED GARTER SNAKE

These snakes were seen in greater abundance than any others. Since they have the habit of sunning or lying exposed on the grass more often than other species, perhaps they are detected more readily. This may give a somewhat false impression of large numbers. Their tendency to congregate in one area might also support this. They were found in moist grassy areas as well as on dry rocky slopes.

One site was observed to be heavily populated with short-headed garter snakes: the brushy path leading to the gaging station by the river at Red House. A thicket on each side provided adequate cover, and the freshly mown grass and weeds by the path left an exposed strip for sunning. Each time an observer walked down the path, the snakes (one about every two yards) would quietly slide back to cover from the sun along the path. Two hours were devoted to watching these

snakes. About 10 minutes after being disturbed, they would come out of hiding and return to the sun. Five large adults were captured by waiting quietly in the center of the path. At least four more were seen which were not taken. Two were watched crawling onto a small mound of grass where they coiled slowly about each other and lay sunning for about 15 minutes until they were captured. They were very gentle, never attempting to strike or bite. Instead they coiled gently around one's fingers or hand. The second time the gaging station was visited, the snakes seemed to be as numerous as before.

One individual was found coiled under a rock with a common garter snake, and another was found under the same board as a red-bellied snake.

Associated species:

Common garter snake

Ring-necked snake

Red-bellied snake

Records:

July 23, gaging station by river, 5 adults taken, 4 more observed.

July 25, Keith's Bog, 1 adult female under old stump on grassy kame overlooking Red Pond (gravid with 9 young, nearly ready to be born), 6 under debris on slope overlooking Keith's Bog.

July 28, Quaker Run camping area, 1 adult, d.o.r.

Aug. 14, gaging station, several seen along path.

Aug. 16, Red House, near gaging station, 1 adult under slab in field.

Aug. 20, Hotchkiss Hollow, 1 adult in cornfield.

Aug. 23, Sawmill Run, 1 adult by roadside.

EASTERN GARTER SNAKE

Although seen several times throughout the summer, this species was not seen in as large numbers as the short-headed garter snake. When disturbed in an exposed position, the snake seemed to perform its aggressive display of puffing and striking, an attitude not observed if the snake were found under cover.

Associated species:

Short-headed garter snake

Red-bellied snake

Ring-necked snake

Records:

July 9, Bradford Junction, 1 adult crawling in leaves on dry, sunny hardwood slope.

July 10, Quaker Run, Wolf Run Road, 1 adult under rock in rut of woods road.

July 17, Quaker Run camping area, 1 adult, d.o.r.

July 25, Keith's Bog, 1 adult under debris at base of blueberry bush on slope, 1 subadult in recently mown field near Blood Road struck and puffed when approached.

Aug. 8, Balsam Fir Swamp, 1 large adult exposed in field displayed viciously when approached, flattening entire body and striking.

Aug 17, Brown's Hollow ridge, 1 adult crawling on sunny leaves below boulder of rattlesnake den.

Aug. 22, Randolph Fish Hatchery, 1 adult taken near fish tanks.

NORTHERN SMOOTH GREEN SNAKE

This snake was observed only once during the summer. Its protective coloration might prevent its having been observed more often.

Associated species:

Ring-necked snake

Red-bellied snake

Common garter snake

Record:

July 17, A.S.P. No. 1, 1 adult under shale on steep sunny roadbank.

NORTHERN RING-NECKED SNAKE

Less common than the red-bellied snake, but in the same habitat, this species was found frequently on sunny banks under rocks.

Associated species:

Red-bellied snake

Common garter snake

Smooth green snake

Short-headed garter snake

Records:

July 10, Quaker Run, near railroad bridge, under rocks near shaded dump.

July 11, Wolf Run, along railroad tracks, 3 adults, 2 under same slab, another about 10 yards away.

July 17, A.S.P. No. 1, under shale slab on steep sunny road cut.

EASTERN MILK SNAKE

Only one specimen was seen during the summer. It was sunning on the cinders by the railroad track and made no effort to escape when captured.

Record:

July 23, Meetinghouse Run, Route 17, by railroad track.

TIMBER RATTLESNAKE

Although the Allegany Park region is one of the few remaining localities in New York State where the timber rattlesnake may be found, it seems to be getting scarce even there. The species is seen so rarely that many of the campers coming to the park never know of its existence. Most of the "snake stories" that the natives tell of seeing rattlers in the park are from years ago; few of the people have seen a live rattler in recent years, except near the den sites.

Alden Wright, a youth who lives on Wolf Run Road near Brown's Hollow, took the investigators to the rattler den on the ridge which

his family has known about for years. He said that even there, where he never failed to find rattlers, they were getting very scarce. He reported having seen only two during the summer in early August. One adult was killed on Brown's Hollow road by the workers while widening the road. Another large adult was taken by Alden from a small ditch near the abandoned School No. 3.

The snake den examined was an accumulation of scattered large blocks of quartz conglomerate in a mixed deciduous forest. The second growth of maple, oak, hickory and serviceberry permitted abundant sunlight to fall on the forest floor. Patches of earth on the boulders afford a favorable site for the growth of moss, ferns, small trees and shrubs on the larger rocks. Rough ledges and deep crevices on the sides and under the boulders provided adequate hiding places for the snakes.

The snake found was a pregnant female, 46 inches long, with 11 rattles. It was coiled at the base of a clump of serviceberry trunks, shaded and well hidden from sight, on one corner of a 15-foot by 15-foot boulder, about 4 feet from the ground. The snake did not rattle or attempt to escape as a noose was slipped around its neck. It did rattle when stretched on the rock. The snake was kept in captivity until September 25 when it gave birth to 12 young. One was born dead. A complete description of the litter is being published (Stewart, *et al.*, 1960).

Record:

August 17, Brown's Hollow ridge, 1 pregnant female.

SMALL MAMMALS

Since no detailed study of small mammals of the Allegany region in New York State has been made, a special effort was made to obtain exact data on distribution, population density and variation within populations for the area. Knobloch (1943, 1944) included small mammals in his list of Allegany Park mammals, but included little specific data about them.

Table II, a resumé of trapping done and results of the trapping efforts, indicates species trapped on each site. Sex, weight, measurements and breeding condition of each animal captured were recorded. Extremes and means for these data are given in table III. Actual data sheets have been deposited with the curator of zoology, New York State Museum, where they are available for reference to anyone desiring further information.

Table II gives some indication of the relative numbers of animals captured at various sites. It is understood that these represent only those animals which are taken by traditional trapping techniques. For those species which are trap-shy (such as *Synaptomys cooperi* and *Sorex*) numbers taken are not necessarily an indication of relative numbers present. Other species may well be present which were never seen (such as *Cryptotis parva*). *Sorex palustris* has been taken from Stoddard Creek near Red House (Eaton, 1945). Traps were set at close intervals along the banks and in the creek at the same site, but no

shrews were taken. Raccoons were a serious hazard to trapping in the area; of 150 traps set, 140 were sprung by the raccoons which seemed to enjoy pushing them into the water and playing with them.

Numbers of species trapped in any area must be considered in view of numbers of trap nights in that area. Even so, a distinct difference was noted in the relative abundance of species, or of numbers of a single species, between different collection sites. The largest numbers of animals trapped were in the wooded areas of the park or reservation. It is of interest to note that the next greatest number of species, as well as the most dense population found, was on the large wooded islands in the Allegheny River. These will be discussed separately. Numbers were noticeably low in the open field habitat (site No. 10), where cover was light and the field very dry, and in the recently burned flats (site No. 4). Although there was plenty of cover in the flats, there evidently had not been time for animals to move into the area; food might also be a limiting factor. Another site with marked paucity of life was the small balsam fir stand (No. 27). It seemed to be a natural cover in the center of an open grassy pasture; moisture was abundant and a variety of plants would seem to provide adequate food. The constant disturbance by a herd of cows might have some effect on the small mammals.

Small mammals trapped, in order of abundance, were as follows: *Blarina brevicauda*, *Peromyscus leucopus*, *Microtus pennsylvanicus*, *Napaeozapus insignis*, *Peromyscus maniculatus*, *Zapus hudsonius*, *Clethrionomys gapperi*, *Sorex cinereus*, *Sorex fumeus* and *Synaptomys cooperi*. From the presence of *Blarina brevicauda* and *Peromyscus leucopus* in the majority of sites, it seems that these two species have the widest local distribution.

The lemming mouse is certainly much more common than trapping results indicate. It seemed to inhabit small grassy clearings within wooded areas. Evidence of its presence, piles of matchstick size grass-cuttings and green droppings, were found in two areas where the animals were not taken. Even in the areas where they were trapped, traps were left down several nights before a catch was made. They had been previously trapped in the park by Dr. W. J. Hamilton, Jr. (1941).

Bottle fly larvae (*Cuterebra* sp.) were prevalent in species of *Peromyscus*. Twelve percent of both *P. leucopus* and *P. maniculatus* were infected, the incidence being equally divided between males and females. These were found only in August. Other species infected were *Microtus pennsylvanicus*, *Napaeozapus insignis*, and *Sciurus* sp. Of the 14 infections in *P. leucopus* encountered, 12 occurred in animals from the islands where 30 percent of the animals taken were infected. Forty percent of the *P. maniculatus* from the islands were infected. No infections were found in this species from other sites. The reason for this difference is not known; perhaps it was a result of lessened resistance due to overpopulation, or possibly the islands are especially suited to the breeding of bottle flies.

INSULAR POPULATIONS

There are several large islands in the river in the Red House-Quaker Bridge area. The largest is 40 to 50 acres in extent. They are wooded, the large trees being principally silver maple, American elm, sycamore, red maple and black willow. At the time of this study, there was usually a lower growth of shrubby willow around the edge of the islands. Open patches afforded a lush growth of sedges, composites, wild grape, nettles, touch-me-not and violets. Ostrich ferns, often shoulder high, were present in large areas in partial shade from the large trees. Narrow strips of pebble beach surrounded parts of the islands during the summer when the water was low. The islands were accessible from the mainland by wading. The water was less than a foot deep in some stretches during August. Small waterholes in various stages of desiccation were present on the islands.

Results obtained from island trapping were markedly different from other localities. The two islands near Erie Station yielded in one night (40 trap nights) a 60 percent catch. The island immediately below Quaker Bridge yielded in two nights (394 trap nights) a 21 percent catch. The reason for the extremely high populations is not known. Whether it was relative freedom from predation by shrews, or abundance of food or some other factor was not determined. Measurements of animals taken from the island did not differ from those from the mainland. Weights were slightly greater. The islands are flooded every spring. Piles of debris left from high water, and the verdant plant growth provided abundant cover. Fruits and seeds seemed to be abundant. A field mouse was observed feeding on *Viola sororia*, which was present in large patches.

Larger mammals are present on the islands. Deer and raccoon tracks were common, and one opossum was taken from the Quaker Bridge island. Red squirrels were trapped, and a mink was seen carrying off a victim of a snaptrap.

Peromyscus leucopus, *Microtus pennsylvanicus* and *Zapus hudsonicus* were the most abundant species trapped. The marked scarcity of shrews might account for the large number of mice. Three *Blarina brevicauda* and one *Sorex cinereus* were taken. Elsewhere *B. brevicauda* was taken in greater numbers than any other species. This apparent scarcity of shrews might be due to the annual flooding which would destroy many more fossorial forms than mice, which can climb easily.

A detailed study of the seasonal and annual variation in the populations of small mammals on the islands would provide some much needed information about the effects of flooding on small mammals.

LARGE MAMMALS

Since a reliable census of large mammals is extremely difficult, no effort was made to evaluate exactly the population size of these forms in the short time available. However, notes were taken on species

observed and their signs. Much of the information obtained by Richmond and Rosland (1949) in the adjacent region of Pennsylvania might be applicable to this area, especially that part concerning Warren County which lies just south of Allegany State Park and the Indian reservation.

BIG GAME

Virginia deer and black bear are the only big game forms on the reservation. Deer are common in the reservation as well as in the adjacent park where they abound. Open fields and meadows, surrounded by wooded sections, provide excellent grazing, browse and cover. Tracks were seen in almost every site examined. Paths through the grass and woods were seen along Sawmill Run, Bone Run, Quaker Run near Wolf Run Road, on the islands, by the gravel pit, in the flats near Bradford Junction and in the Tunungwant Swamp. A doe and two fawns were seen on State Line Road July 17. Deer were frequently seen in the park, either alone, with a fawn or in groups up to five. They were seen more frequently in the area near Red House Lake than anywhere else. They were seen during the day as well as early morning and evening and after dark. The park deer were studied previously by Shadle and Stalken (1942).

Although no bears were seen outside the park, a tree clawed by bears and a wallow were found near State Line Road. One of the Indians reported having seen a bear in the river near Quaker Bridge early in July. The abandoned land and forested hills in the reservation and to the west of it are well suited to bears. Patches of wild strawberries, blueberries and blackberries abound. Ant colonies are common. Bears seem to be more common in the park where they are frequently seen along the highways and feeding at the park dumps. A bear with four cubs was seen during the summer at the park dump. Three of these and one other adult were trapped by Hugh Black who was studying the bears in the park. He reported that numbers were lower this year than in previous years, but that an exact estimate of the population could not be made; 15-20 bears are taken each year from the park area.

UPLAND GAME

Cottontails, hares, gray squirrel, gray and red fox, raccoon, opossum and woodchuck are the upland game species in the reservation. Much overgrown farmland and woodland provides abundant cover for these forms.

Perhaps the most abundant species in the reservation, the park and adjacent farmland is the raccoon. Its marks—tracks and scats—were ubiquitous along the edge of the river, streams, draws and mud puddles. Farmers to the west of the reservation complained of coon damage to crops, and sometimes have wholesale hunts to reduce the number of animals which have become serious pests. On the other hand, raccoons are encouraged in the park by campers and garbage. Almost any night along A.S.P. No. 1 between Red House and the Quaker Bridge camping area, 15 to 25 raccoons, including several mothers with 2 to 4 young could be counted. They made nightly tours from cabin to cabin

to raid garbage cans. Tracks were abundant on the islands as well as on the mainland.

Woodchucks were abundant both in the open bottom lands and the higher wooded slopes and riverbanks. Their population must reach near capacity for the area. They were seen frequently feeding along the roadbanks and in the fields. Their holes were found in most collection sites. Opossum were seen dead on the road, except for one specimen taken in a trap on the Quaker Bridge island.

Although no gray squirrels were seen on the reservation during the summer, they were seen frequently in the park, just on the edge of the reservation, and in the Red House camping area. About 30 percent of those seen were black, or melanistic individuals. The "squirrel niche" seems to be occupied to a much greater extent by the red squirrels which were seen along the river, in the higher mixed forests and frequently in the park.

Red and gray foxes are present on the reservation and in greater numbers in the park. No gray foxes were seen during the summer, although previous reports (Knobloch, 1944) and accounts of the residents indicated their presence. Nine observations of red foxes were made in the park during the summer.

Relatively few cottontails were seen during the summer. It was impossible to tell by sight whether they were *Sylvilagus floridanus* or *S. transitionalis*. One *S. floridanus* was found dead on the road near the Friends Indian School. Individuals were flushed on Wolf Run Road near Quaker Run, and near the old church at the junction of Routes 280 and 17. The recent status of the species in the area is not known. Several species of rabbits have been released in the area in the past. The Indians trap and hunt rabbits during the winter. They reported the presence of the varying hare on the higher ridges. None were seen during the summer.

FUR-BEARING MAMMALS

Fur-bearers on the reservation include beaver, muskrat, raccoon, opossum, red and gray fox, skunk, mink, and various weasels. The raccoon, opossum and foxes were discussed in the previous section.

From reports by local residents and from the Conservation Department, little trapping is being done on the reservation. Fur prices are low, and most of the Indians are occupied with jobs outside the reservation which provide adequate livelihood without the hunting and trapping.

Beavers did not appear to be common on the reservation although several colonies were established in the park and on the streams feeding into the river from outside the reservation (Pierce Run, Bone Run). A colony was present in the gravel pit near Red House and in Quaker Run near the western edge of the park. The park beavers were quite tame (Bay State Road, Frances Brook Road) and worked in spite of numerous observers. Aspen and willow were abundant in many areas so that food probably was not a limiting factor in their spread. Previous investigators made detailed studies of the park beavers (Shadle and Austin, 1939; Shadle *et al.*, 1943). The Conservation Department had only one

record of a beaver taken from the reservation in 1957, that one coming from the Township of Salamanca.

Muskrats seemed to be the most abundant fur bearer in the reservation. Their well-used holes were abundant along the riverbanks, small backwaters and along streambanks where there were deeper pools. Since banks were soft and open bodies of still water were not abundant, the streambank homes were utilized almost entirely rather than building open water houses. Houses were seen only in the Tunungwant Swamp. One muskrat was seen feeding at the head of Science Lake; five were frightened from the edge of the gravel pit where they were feeding. Scats were found often on rocks and logs near the edge of the river and streams.

Although only one mink (Quaker Bridge Island) and no weasels were seen during the summer, they are present in fair abundance according to previous investigations (Knobloch, 1944). Some mink trapping is done, but not nearly so much as in the past.

Several skunks were seen dead on the road during the summer; four individuals were seen along the road and trails in the Quaker Run camping area, and two were seen feeding along the roadside on Route 17 near Red House.

MISCELLANEOUS FORMS

These animals include the porcupine, red squirrel, chipmunk and bats. Although the red squirrel and chipmunk appear in the trapping table of small mammals, those taken in traps do not represent an indication of numbers in the area.

The porcupine is seen on the reservation, but seems to occur more frequently in the park. There it is often caught in the campsites chewing on equipment. Its numbers are not yet to a point of requiring control measures by the Park Commission. Two records were taken from the reservation during the summer. One large adult was seen by the road between Steamburg and Quaker Bridge on the night of July 19. A carcass, evidently a train casualty, was found on the tracks at Wolf Run. Five were seen in the park during the summer; all were observed either in the late evening or at night.

Both the red squirrel and the chipmunk are common in the area, particularly in the park. The chipmunks are the more numerous, existing in large numbers in the park, especially where there are many rocks to afford shelter.

Small bats were seen in the evenings flying over beaver ponds and in clearings in the park, or flying through the cabin porches. A few used the largest crevices at Bear Caves for sleeping places but no more than three were seen there at any one time. On July 28, one adult male *Myotis lucifugus* and one adult male *Pipistrellus subflavus* were taken from Bear Caves during the day. One *Myotis lucifugus* was taken July 20, when it flew onto the porch of an old abandoned house near the outdoor theater by the Tunungwant Swamp.

POSSIBLE EFFECTS OF FLOODING

The nature of the topography and the distribution of mixed vegetation afford many varied habitats for numerous faunal types. Clearings interspersed with woodlots and bordered by brush or shrubs, an abundance of small streams and a meandering shallow river with small bayous characterize the area. These provide food, cover and water for the variety of animals and plants present. If the river valley is flooded, this would eliminate those habitats associated immediately with the river but would create a deep, cold water reservoir, a situation which is now absent from the region. It is difficult to estimate the effects of flooding on the flora and fauna of the area. Much depends upon the depth of the water and the degree of fluctuation of the water level. The time of year that flooding occurs is an extremely important factor. If the water rises in the spring and summer, when many animals are reproducing, and young are still in nests (especially ground-nesting birds and mammals), or are too weak to escape, destruction to wildlife will be great. Very early spring before most forms are nesting, or late summer before chipmunks, jumping mice, woodchucks, reptiles and amphibians are hibernating, would be the best time for the change to occur. If flooding occurs at such time, most animals could move to higher ground to establish territories. This, however, could create serious difficulties with those species where population pressure is already high. Deer, for example, which already exist in high numbers in outlying areas, might suffer from lack of food due to overcrowded conditions. This might well be the case with small mammals, such as deer mice, field mice, jumping mice and shrews, which serve as food supply for larger forms.

Two species have been found in the area of possible impoundment which were not found at higher elevations in the region under discussion. These are the hellbender and the coal skink, both species with a limited distribution in the State. Excepting these, other species exist in numbers large enough in surrounding areas not to suffer extermination from the region.

With the exception of the river and its immediate environs, there seems to be no significant difference in types of habitats which occur in the reservation and those in adjacent areas. However, such a drastic change as flooding an entire river valley must necessarily have many imperceptible and far-reaching, little understood effects on an entire area.

Certain of the natural habitats present will be destroyed. Aquatic species adapted to swift, shallow water or shallow quiet backwaters will be affected. A deep, cold water habitat, probably with a fluctuating water level, will be created suddenly. Annual changes in water level and silt deposition will create mudflats, advantageous to few forms, and will thereby alter the vegetation between high and low water levels as well as changing the face of the marginal vegetation, and thence the fauna. If an effort is made to create a variety of habitats, such as quiet shallow backwaters (particularly for breeding amphibians), the total impact

of the change might not be so drastic. Careful control of the water level to prevent a great amount of fluctuation would also be a help.

The river bottom lands provide foraging areas for many forms—snakes, frogs and toads, mice, moles and shrews, mustelids, rabbits, foxes, woodchucks, raccoons, opossum, as well as many deer. The flooding of such a large amount of their natural territory could affect each species as well as its predators. Beaver and muskrat might be forced out of the reservation entirely but they could probably survive in some of the smaller streams of the higher coves above a changing water level which prevents the establishment of permanent homes.

Another area to be considered, although it does not lie in New York State, is the river below the dam. It is the site that can be affected most seriously by frequent flushings of cold water from the reservoir. The result can be a biological wasteland since few forms can tolerate, especially in early developmental stages, such a drastic change in water temperature and depth. This would influence particularly various stream fishes present as well as their food supply.

SUGGESTION FOR FURTHER STUDY

If flooding of the valley is to occur, all previous knowledge of the area should be put to use and a serious and extensive study made of the changes produced by flooding. Very little is known of the actual effects of flooding of a large area since few followup studies have been conducted in inundated regions. If such a study could be made, it would be a great contribution to biological knowledge. It is realized that every such instance is different since conditions in each area are different, but a study of one example would eliminate some of the guessing which takes place every time the building of such a reservoir is considered. The value of the reservoir and the expense of building it could then be weighed more carefully against the effects it might have on the vegetation and animal life.

TABLES

TABLE I
Collection Sites in the Allegheny Indian Reservation and Adjacent Areas

| AREA | QUAD-RANGLE | HABITAT DESCRIPTION | APPROX. ELEV., FT. | EXPOSURE | NO. COLL. | DATE |
|---|-------------|--|---|--|-----------------------|---|
| 1. State Line Run, State Line Road | Randolph | A. Banks of State Line Run, $1\frac{1}{4}$ mi. W. of Allegheny River; open meadow, abandoned orchard, sedges and willows rank by streambank B. Moist hemlock-beech-maple woods, S. bank of run, $\frac{3}{4}$ mi. W. of river; heavy shade and leaf mold C. Beech-maple-oak-hickory slope, second growth, few fallen logs, $\frac{5}{8}$ mi. W. of river D. Small clearings by logging road fording run; sedges, grass, <i>Rubus</i> , bracken bordering beech-maple-birch-hemlock-cherry E. Recently logged woods, N. side State Line Road, $\frac{3}{4}$ mi. W. of river | 1,340 1,320 1,300-1,360 1,290 1,290 | open dense shade southern open shade partial shade | 1 2 1 2 3 | July 8 July 8, 17 July 8 July 8, 17 July 8, 17, Aug. 23 |
| 2. Sawmill Run, E. of Onoville | Randolph | Creek bottom and flats from road to river ($\frac{1}{4}$ mi.); bottom land, muck with cover of skunk cabbage, <i>Impatiens</i> , nettles; scattered maple-beech-blue beech-elm-hawthorn | 1,280 | partial shade | 3 | July 16, 17, Aug. 23 |
| 3. North Branch, Bone Run | Jamestown | A. Open meadow of sedges, composites by beech-maple woods; $2\frac{1}{4}$ mi. W. Bone Run Road B. Abandoned orchard; apple, sumac, aspen, hawthorn by hickory, sugar maple woods; 3.2 mi. N. W. from Bone Run Road C. Beech-maple-hemlock woods $1\frac{1}{4}$ mi. N. of Bone Run Road; both sides of road, S.-facing slope, creek bottom | 1,460 1,540 1,440 | open, N.—facing slope open, N. E.—facing slope shade | 1 3 2 | July 29 July 29, 30, 31 July 6, 30 |
| 4. Recently-burned flats by Route 346 to Onoville | Randolph | Dominated by scrub oak, bracken fern; burned 1 yr. previous to collections; $\frac{3}{4}$ mi. S. E. of Hotchkiss Hollow School | 1,360 | open, partial shade | 1 | July 31 |
| 5. Wolf Run, Allegheny River and banks | Randolph | Old field, shaded rocky run, beech-maple-hemlock slope of Elko Mt.; talus slope of railroad cut; river bottom on bank opposite mouth of Wolf Run | 1,300-1,327 | varied | 6 | July 11, 12, 17, Aug. 7, 24, 28 |
| 6. Quaker Run, at railroad bridge crossing | Randolph | Wide run (15-20 yds.) 1-3 ft. deep; bordered by silver maple, elm, ash, poplar, <i>Rubus</i> , which merge into beech-maple-birch covered hillside; $\frac{1}{2}$ mi. E. of Allegheny River | 1,315 | E.—facing slope | 3 | July 10, 11, Aug. 28 |

TABLE I—Continued
Collection Sites in the Allegany Indian Reservation and Adjacent Areas

| AREA | QUAD-RANGLE | HABITAT DESCRIPTION | APPROX. ELEV., FT. | EXPOSURE | NO. COLL. | DATE |
|--|-------------|---|--------------------|-----------------|-----------|---------------------|
| 7. Large island S. of Quaker Bridge | Randolph | Pebble beach, willow thickets at edge; sedges, composite among large silver maple, elm, sycamore; $\frac{1}{2}$ mi. S. of Quaker Bridge | 1,310 | partial shade | 4 | Aug. 1-4 |
| 8. Cold Spring Creek | Randolph | Dry run partially shaded by weeds and shrubby bank; oak-hickory-birch-maple woods; N. of railroad track, $1\frac{1}{4}$ mi. E. of Steamburg | 1,367 | partial shade | 1 | Aug. 20 |
| 9. 2 large islands, Allegheny River near Erie Station | Randolph | Similar to island previously described | 1,320-1,330 | partial shade | 2 | July 23, 24 |
| 10. Junction Routes 17, 280 | Randolph | Abandoned open field of asters, goldenrod, red top, panic grass; <i>Vaccinium</i> , <i>Rubus</i> , bracken, willow and sassafras bordered by sumac and poplar; by old church | 1,350 | open | 4 | Aug. 19-22 |
| 11. Old Gravel Pit off Route 17, near Red House | Randolph | Water about $\frac{1}{4}$ mi. x 50 yds.; wooded on S. side, meadow on N. side with sedges, rushes, willow, <i>Cornus amomum</i> bordering water; heavy algal growth; marshy at E. end; $1\frac{1}{4}$ mi. W. of Red House about $\frac{1}{4}$ mi. N. of river | 1,340 | open | 3 | Aug. 13, 14, 20 |
| 12. Meetinghouse Run | Randolph | Gravel banks of railroad, rocky stream shaded by alder thickets surrounded by abandoned fields and orchard, $\frac{3}{4}$ mi. W. of Red House N. of Rte. 17 | 1,350 | open shade | 1 | July 23 |
| 13. Red House, area by gaging station, Allegheny River | Randolph | Wooded shrubby area by river and abandoned house; old field and orchard; goldenrod, sumac, wild cherry, grape, poplar | 1,350 | partial shade | 4 | July 23, Aug. 14-16 |
| 14. Bradford Junction, intersection Routes 17 and 219 | Salamanca | Dry oak-hickory hillside N. of Rte. 17; swampy river bottom flats—elm, maple and lush herbaceous growth | 1,500-1,700 | S.—facing slope | 1 | July 9 |
| 15. Tunungwant Swamp, Limestone | Salamanca | Open marshy meadow of sedges, rushes, emergent aquatic; thickets of alder, dogwood, <i>Viburnum</i> , hawthorn, rose | 1,400 | open | 2 | July 19, Aug. 12 |
| 16. Sphagnum Bog, (Bear Bog), A. S. P. | Salamanca | Wooded sphagnum swamp; beech-maple-hemlock-magnolia-switch hazel; heavy leaf mold and humus; $\frac{1}{2}$ mi. N. of State line, 200 yds. W. of Bradford road | 2,170 | shaded | 3 | July 9, Aug. 1, 2 |

TABLE I—Continued

Collection Sites in the Allegany Indian Reservation and Adjacent Areas

| AREA | QUAD-RANGLE | HABITAT DESCRIPTION | APPROX. ELEV., FT. | EXPOSURE | NO. COLL. | DATE |
|--|-------------|--|--------------------|------------------------|-----------|----------------------------|
| 17. Blacksnake Mt., Science Lake, A. S. P. | Randolph | Open area surrounding Science Lake, maple-birch woods on level with lake and slope of mountain immediately above and E. of Science Lake | 1,860-2,000 | shade, open, northern | 1 | July 22 |
| 18. Bear Caves, A. S. P. | Randolph | Open beech-birch-maple woods surrounding large shelf of Salamanca conglomerate outcrop, Quaker Run area | 1,650 | S.—facing; shade | 4 | July 28, 30, 31, Aug. 25 |
| 19. Quaker Run at McCabe Trail A. S. P. | Randolph | Damp beech-maple-cherry-hemlock woods with open floor; creek running all summer, $\frac{3}{4}$ mi. E. of Quaker Run rental office | 1,500 | dense shade | 1 | Aug. 6 |
| 20. Coon Run, at end of Gypsy Trail A. S. P. | Randolph | Woods as above, small grassy clearings near trail, rapid rocky stream with many moss-covered boulders in and along stream; Quaker Run camping area, under observation entire time since it was adjacent to living quarters | 1,550 | shade | 10 | July 21, Aug. 15-17, 21-26 |
| 21. English-Stoddard Road (A. S. P. No. 1) | Randolph | Shale bank of road cut in open sun most of day; scattered vegetation of <i>Rubus</i> , <i>Lycopodium</i> , grasses and sedges; beech-maple woods on each side of road; 3 mi. N. of Quaker Run rental office | 2,050 | S. W.—facing slope | 1 | July 17 |
| 22. Stoddard Creek and tributary off A. S. P. No. 1 | Randolph | Open woods of beech-maple-hemlock-cherry; tributary largely dried except for small pools, but creekbbed moist; from A. S. P. No. 1 to Stoddard Creek and about 200 yds. along creek | 1,700-1,840 | shade, W.—facing slope | 2 | Aug. 7, 8 |
| 23. Bear Springs, off A. S. P. No. 1 | Randolph | Maple-beech-hemlock woods surrounding small clearing of abandoned campsite centered around springs and rocky streams, $2\frac{1}{4}$ mi. N. of Quaker Run rental office | 1,920 | open, shade | 2 | Aug. 25, 26 |
| 24. A. S. P. No. 1, 2.2 mi. N. of Quaker Run rental office | Randolph | Small grassy clearing, wet, about $\frac{1}{2}$ acre; <i>Solidago</i> , <i>Scirpus</i> , <i>Juncus</i> , <i>Typha</i> ; on west side of highway | 1,800 | open | 5 | Aug. 7, 8, 15-17 |
| 25. Stoddard Creek near Red House camping area | Salamanca | Several sites along creek, partially in small open meadow surrounded by pine woods; beech maple woods at base of E.—facing slope; $\frac{3}{4}$ mi. S. of Red House Lake, near A. S. P. No. 1 | 1,520 | varied | 4 | Aug. 21-24 |
| 26. A. S. P. No. 1, hillside E. of highway | Salamanca | Planted stand of red, Scotch, and white pine on slope with small clearings of <i>Aster</i> , <i>Rubus</i> , <i>Asclepias</i> ; $\frac{3}{4}$ mi. S. of Red House Lake | 1,500-1,600 | W.—facing | 3 | Aug. 23-24 |

TABLE I—Concluded

Collection Sites in the Allegany Indian Reservation and Adjacent Areas

| AREA | QUAD-RANGLE | HABITAT DESCRIPTION | APPROX. ELEV., FT. | EXPOSURE | NO. COLL. | DATE |
|---|-------------|---|--------------------|-------------|-----------|------------|
| 27. Balsam Fir Swamp at edge of A. S. F. | Randolph | Small isolated stand of balsam fir, white pine, hemlock, yellow birch, red maple, willow, deciduous holly; sphagnum, but almost dry; <i>Juncus</i> and <i>Scirpus</i> in marshy areas surrounding trees; north of Route 382, 1 mi. E. of Red House | 1,375 | shade, open | 2 | Aug. 9, 10 |
| 28. Brown's Hollow Ridge, N. W. of Brown's Hollow 2 mi S. of Elko | Randolph | Oak-hickory-birch-cherry- <i>Amelanchier</i> -magnolia dry woods at top of ridge; outcrop of conglomerate forming large boulders, many covered with leaf mold, moss and shrubs; deep crevices between rocks | 2,200 | open shade | 1 | Aug. 17 |
| 29. Quaker Run, at crossing of A. S. P. No. 3 and 1 mi. E. | Randolph | Mixed maple-beech-hemlock-birch woods merging with predominately oak-hickory woods on slopes | 1,340 | shade | 1 | Aug. 25 |
| 30. Keith's Bog and Red Pond near Steamburg | Randolph | Sphagnum bog and pond surrounded by black spruce, white pine, <i>Vaccinium</i> , <i>Spirea</i> , <i>Pyrus melanocarpa</i> , <i>Rhus vernix</i> , <i>Scirpus</i> , <i>Juncus</i> , <i>Carex</i> ; kettles surrounded by grassy slopes: 1 mi. N. E. of Price Corners, $\frac{1}{2}$ mi. N. of Blood Road. | 1,410-1,450 | open | 1 | July 25 |
| 31. Randolph Fish Hatchery | Randolph | Shrubs and grass lawns | 1,300 | open | 1 | Aug. 27 |

TABLE II
Small Mammal Populations as Indicated by Trapping Results in Various Localities

| COLLECTION SITE | NUMBERS TRAPPED AT EACH SITE | | | | | | | | | | | | | | | |
|---|------------------------------|--------------------|---------------------------|------------------------|---------------------|-------------------------------|----------------------------|---------------------------|------------------------------|--------------------------------|-------------------------|----------------------------|-------------|-----------------|---------------|-------------|
| | <i>SOREX CINEREUS</i> | <i>SOREX FUMUS</i> | <i>BLARINA BREVICAUDA</i> | <i>TAMIAS STRIATUS</i> | <i>TAMIASCIURUS</i> | <i>PEROMYSCUS MANICULATUS</i> | <i>PEROMYSCUS LEUCOPUS</i> | <i>SYNAPTOMYS COOPERI</i> | <i>CLEITHRONOMYS GAPPERI</i> | <i>MICROTUS PENNSYLVANICUS</i> | <i>ZAPUS HUDSONICUS</i> | <i>NAPAEZAPUS INSIGNIS</i> | NO. SPECIES | NO. INDIVIDUALS | PERCENT CATCH | TRAP NIGHTS |
| 1. Stateline Run..... | | 1 | 10 | | | 6 | 3 | | 1 | | 2 | 1 | 7 | 24 | 16 | 147 |
| 2. Sawmill Run..... | | | 5 | | | | 2 | | | | | | 2 | 7 | 8 | 87 |
| 3. Bone Run..... | 1 | | 15 | | | | | | | 11 | | 3 | 4 | 30 | 10 | 294 |
| 4. Burned flats..... | | | 4 | | | | | | | | 1 | | 2 | 5 | 5 | 99 |
| 5. Wolf Run..... | | | 5 | | | 4 | 5 | | | 4 | 1 | | 5 | 19 | 15 | 130 |
| 6. Quaker Run..... | | | 11 | 1 | | 1 | 2 | | | | 1 | 1 | 5 | 16 | 12 | 138 |
| 7. Island, Quaker Bridge..... | | | 3 | | 1 | 9 | 35 | | | 19 | 17 | | 6 | 84 | 21 | 394 |
| 8. Islands, Erie Station..... | | | | | 1 | 4 | 7 | | | 8 | 3 | | 6 | 24 | 60 | 40 |
| 9. Open field, Routes 17, 280..... | 1 | | 10 | | | | 4 | | | 5 | 1 | | 4 | 20 | 3 | 600 |
| 10. Gaging Station, Red House..... | | | 5 | | | | 9 | | | 12 | 1 | | 4 | 27 | 8 | 320 |
| 11. Sphagnum Bog, A. S. P..... | | | | | | | 5 | | 5 | 2 | | | 3 | 12 | 13 | 94 |
| 12. Bear Caves, A. S. P..... | | | | | | 3 | 5 | 1 | | | | 1 | 5 | 6 | 10 | 60 |
| 13. McCabe Trail, A. S. P..... | | | 2 | | | 1 | 5 | 1 | 3 | | | | 5 | 10 | 11 | 94 |
| 14. Tunungwant Swamp..... | | | 2 | | | | 3 | 2 | 1 | | | | 2 | 5 | 5 | 100 |
| 15. Coon Run, A. S. P..... | 2 | 2 | 17 | 1 | 1 | 11 | 5 | 2 | 1 | | 4 | 39 | 11 | 85 | 17 | 505 |
| 20. Stoddard Creek, A. S. P..... | | | | | | 2 | 1 | | 1 | | 5 | | 4 | 9 | 5 | 164 |
| 22. A. S. P. No. 1, A. S. P..... | 3 | 11 | 5 | 1 | | 1 | 9 | 2 | | 20 | 1 | 7 | 10 | 60 | 29 | 210 |
| 24. Stoddard Creek, Red House, A. S. P..... | 2 | 1 | 11 | | | 1 | 5 | | | 5 | 5 | 3 | 8 | 33 | 8 | 435 |
| 25. Stoddard Creek, Red House, A. S. P..... | | | 2 | | | | 3 | | | | | | 2 | 5 | 3 | 170 |
| 27. Balsam Swamp..... | | | | | | | | | | | | | | | | |
| Total..... | 9 | 15 | 107 | 3 | 3 | 43 | 103 | 5 | 11 | 86 | 41 | 55 | 92 | 481 | 12 | 4,081 |

TABLE III
Summary of Measurements and Reproductive Data of Small Mammals
Mean and Range of Measurements and Weights are Given

| SPECIES | TOTAL LENGTH (MM.) | TAIL LENGTH (MM.) | HIND FOOT LENGTH (MM.) | WEIGHT (G.) | NUMBER MALES | NUMBER FEMALES | NUMBER OF BREEDING MALES | NUMBER OF BREEDING FEMALES | DATES OF BREEDING FEMALES | NUMBER SPECIMENS AVERAGED |
|--------------------------------|--------------------|--------------------|------------------------|------------------------|--------------|----------------|--------------------------|----------------------------|---|---------------------------|
| <i>Blarina brevicauda</i> | 116.8 (102-140) | 25.8 (22-32) | 15.0 (13-16) | 16.9 (10.5-22.7) | 54 | 46 | 10 | 5 | July 10, 18, 30; Aug. 1 | 100 |
| <i>Sorex fumeus</i> | 112.4 (110-117) | 42.2 (39-47) | 13.2 (12-14) | 6.7 (6.1-7.6) | 2 | 2 | .. | 1 | Aug. 1 | 5 |
| <i>Sorex cinereus</i> | 97.8 (90-102) | 39.1 (37-42) | 12.1 (11-13) | 4.1 (3.1-5.4) | 4 | 5 | 1 | 1 | Aug. 24 | 9 |
| <i>Peromyscus leucopus</i> | 163.8 (114-186) | 76.7 (64-94) | 21.0 (19-23) | 20.7 (11.1-34.4) | 59 | 42 | 43 | 17 | July 11, 18, 24; Aug. 1, 2, 6, 8, 13, 21-23 | 98 |
| <i>Peromyscus maniculatus</i> | 174.7 (146-196) | 88.7 (71-105) | 21.4 (20-24) | 20.0 (13-26.5) | 15 | 27 | 11 | 3 | July 17, 26; Aug. 6 | 42 |
| <i>Microtus pennsylvanicus</i> | 155.1 (112-187) | 45.0 (36-57) | 20.8 (19-23) | 35.4 (18.3-59) | 41 | 38 | 19 | 11 | July 12, 24; Aug. 1, 15, 16, 20, 23 | 62 |
| <i>Clethrionomys gapperi</i> | 134.8 (123-149) | 41.0 (36-45) | 18.7 (18-19) | 24.0 (17.1-30.2) | 10 | 3 | 8 | .. | | 11 |
| <i>Synaptomys cooperi</i> | 114.7 | 17.7 | 18.3 | 24.7 | 4 | .. | .. | .. | | 3 |
| <i>Zapus hudsonius</i> | 210.5 (181-239) | 128.1 (110-146) | 29.5 (28-31) | 17.4 (12.2-25.5) | 21 | 15 | 10 | 1 | Aug. 23 | 36 |
| <i>Napaeozapus insignis</i> | 222.5 (196-246) | 139.4 (121-155) | 30.4 (29-32) | 19.9 (10.9-30.3) | 36 | 22 | 21 | 1 | July 21 | 57 |
| <i>Tamias striatus</i> | 227.6 (218-244) | 85.6 (71-90) | 35.0 (33-38) | 97.0 (94.8-98.8) | 2 | 2 | 1 | .. | | 4 |
| <i>Tamiasciurus hudsonicus</i> | 304.0 (302-306) | 119.0 (105-133) | 50.5 (50-51) | 195.7 (159.1-232.3) | 1 | 1 | .. | .. | | 2 |
| <i>Myotis lucifugus</i> | 88.3 (87-90) | 37.3 (36-38) | 10.3 (9-11) | 6.2 (5.9-6.5) | 2 | 1 | 2 | .. | | 3 |
| <i>Pipistrellus subflavus</i> | 81 | 39 | 11 | 4.9 | 1 | .. | .. | .. | | 1 |

TABLE IV
Fleas Taken from Trapped Mammals

| SPECIES OF MAMMAL | SPECIES OF FLEA | NUMBER MALES | NUMBER FEMALES |
|--------------------------------|---|-----------------|-------------------|
| <i>Didelphis marsupialis</i> | <i>Orchopeas leucopus</i> Baker | 1 | |
| <i>Marmota monax</i> | <i>Oropsylla arctomys</i> Baker | 1 | 4 |
| <i>Myotis lucifugus</i> | <i>Myodopsylla insignis</i> Rothschild | | 1 |
| <i>Peromyscus</i> sp. | <i>Doratopsylla blarinae</i> C. Fox | 1 | 1 |
| | <i>Orchopeas howardii howardii</i> Baker | | 1 |
| | <i>Orchopeas leucopus</i> Baker | | 1 |
| <i>Peromyscus leucopus</i> | <i>Ctenophthalmus pseudagyrtes pseudagyrtes</i> Baker | 1 | |
| | <i>Doratopsylla blarinae</i> C. Fox | | 1 |
| | <i>Orchopeas leucopus</i> Baker | 3 | 6 |
| <i>Peromyscus maniculatus</i> | <i>Peromyscopsylla hesperomys hesperomys</i> Baker | | 3 |
| | <i>Ctenophthalmus pseudagyrtes pseudagyrtes</i> Baker | | 1 |
| | <i>Orchopeas leucopus</i> Baker | 2 | 2 |
| <i>Synaptomys cooperi</i> | <i>Peromyscopsylla hesperomys hesperomys</i> Baker | | 2 |
| | <i>Megabothris asio asio</i> Baker | | 1 |
| | <i>Orchopeas howardii</i> Baker | 1 | |
| <i>Tamiasciurus hudsonicus</i> | <i>Orchopeas howardii</i> Baker | | 1 |

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